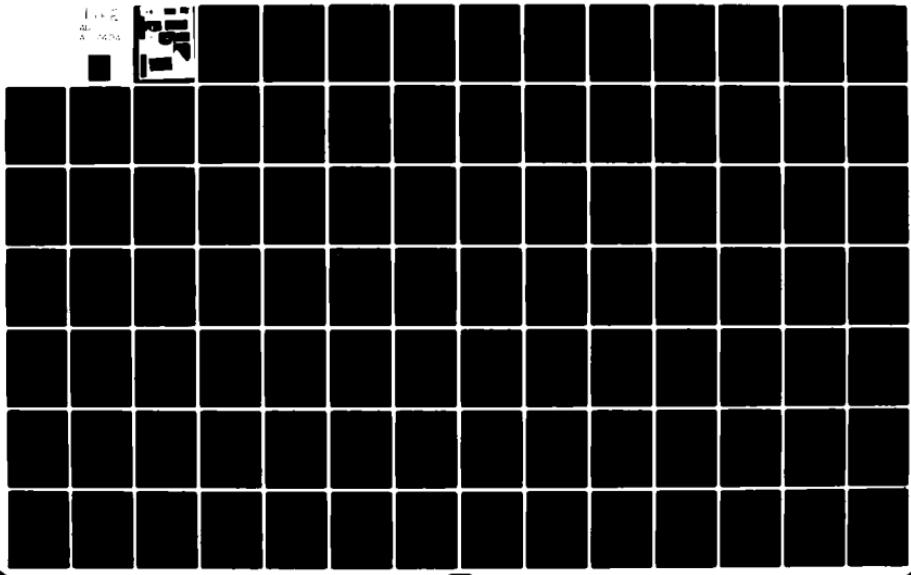
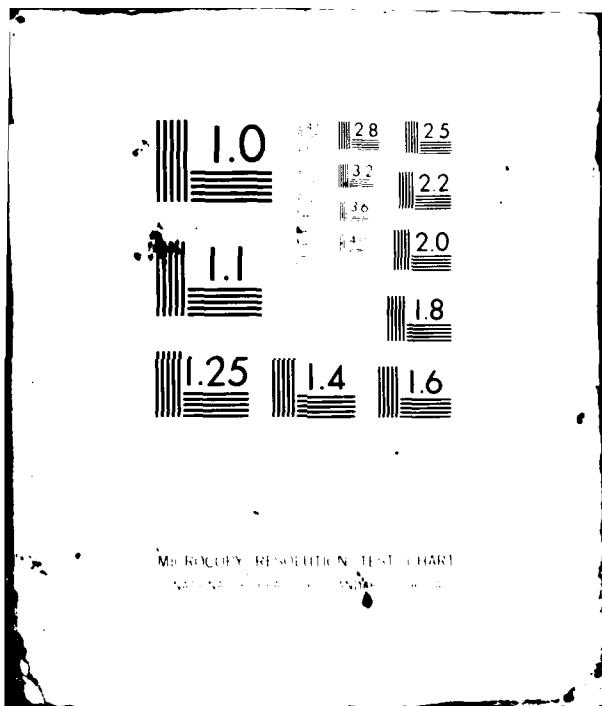


AD-A107 404 ELECTRONIC SPACE SYSTEMS CORP CONCORD MA\*  
FINAL ELECTROMAGNETIC TEST REPORT FOR THE M10-76-8000 HADOME WI--ETC(U)  
AUG 81 NU0173-80-C-0345  
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1102  
AUG 1981







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9 (14) TEST REPORT TR81-8

6 FINAL ELECTROMAGNETIC TEST REPORT  
FOR THE  
M10-76-8010 RADOME WITH XP PLATES.

Prepared For

Naval Research Laboratory  
Washington, D.C. 20375

11 Aug 81

15 Contract No. N00173-81-C-0345  
ESSCO JOB NO. 1886

11 Aug 81

Aug. 1981

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**INITIAL RELEASE**

Prepared by: Rishabh Date: 15 Oct 81

Approved by: J. Parry Date: 11 Oct 81

## **REVISION STATUS OF SHEETS**

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APPENDIX A - Document D81-31, ELECTROMAGNETIC QUALIFICATION TEST PLAN FOR THE M10-76-8000 RADOME WITH XP PLATES

APPENDIX B - CHART RECORDINGS

## 1.0

INTRODUCTION

Electromagnetic tests were conducted to evaluate the performance of the M10-76-8000 Radome fitted with special XP plates supplied by the Navy. The tests were run during the last two weeks of August, 1981. The type of tests, equipment employed, test setups and recorded data are contained in Appendix A. Appendix B contains a list of all chart recordings and a copy of all recordings.

## 2.0

TRANSMISSION LOSS

The transmission loss of the radome was measured by two methods. First, the loss of the radome without the XP plates was measured and found to be 0.6 dB. One-half of the radome was then covered with the plates, the radome rotated in azimuth and the additional loss in the XP plate area recorded.

The second method consisted of establishing a reference level without the radome and then positioning the complete radome (all XP plates installed) over the antenna. The radome was then rotated 360° in azimuth and the variability in loss recorded.

In the first method, the following results were recorded.

Space Frame Alone	Additional Loss in XP Plate Area	Total Loss
Low Band	0.6 dB	0.3 to 0.6 dB
Mid Band	0.6 dB	0 to 0.55 dB
High Band	0.6 dB	0.3 to 0.9 dB

The results are recorded on patterns numbered 69, 70 and 71.

In the second method, the recorded loss was:

	<u>Transmission Loss</u>	<u>Variability</u>
Low Band	1.1 dB	±0.25 dB
Mid Band	1.2 dB	±0.35 dB
High Band	1.5 dB	±0.35 dB

Recorded data is shown on patterns 16, 17, 18 and 19 for low band; on patterns 38, 39, 40 and 41 for mid band; and on patterns 60, 61, 62 and 63 for high band.

Due to the variability in loss as a function of radome azimuth rotation, the maximum loss recorded is dependent upon the radome/antenna look angle. As this angle was not noted during the measurements, the results of the tests using the first method are probably more representative of the actual loss through the radome.

The transmission loss was somewhat higher than predicted in the design analysis. The thickness and variation in thickness of the XP plates should be measured. Electrical tests should also be conducted to determine if the loss of the plates is indeed a contributing factor in the higher loss values measured.

### 3.0 SIDELOBE PERTURBATION

With the antenna enclosed by the radome, 12 different antenna/radome orientations were measured at each of the three test frequencies. The antenna was measured without the radome and the change in sidelobe levels noted. On the data sheets (Appendix B), an increase in sidelobe level is prefixed by a (+) and a decrease in sidelobe level prefixed by a (-). Each antenna pattern was measured with a recorder chart speed of 90 degrees and 18 degrees per chart cycle. In addition, an antenna pattern was measured at each test frequency (with and without radome) using a chart speed of 360 degrees per chart cycle to investigate far out sidelobes. All levels were below -38 dB except for some extraneous signal levels which were present with and without radome and were marked with an (x) on the recorded data.

At the start of the measurement program, XP plates were installed in one-half of the radome. Antenna patterns were recorded at mid band for the section of the radome with the plates and also for the section of the radome without the plates. This data is shown in patterns numbered 67 and 68.

### 4.0 BEAM WIDTH CHANGE

The change in the 3 dB beam width due to the presence of the radome was determined by noting the change on the expanded (18 degrees per chart cycle) antenna patterns. The data is summarized on a Data Sheet (Figure 4). At low band, an average increase in beam width of about 9% was noted. At mid band, the increase in beam width was 3%; and at high band, the increase was about 6%.

### 5.0 ANTENNA BEAM SYMMETRY

The change in main beam symmetry or beam skew due to the presence of the radome was measured in the following manner. First, the expanded (no radome) antenna main beam pattern was bisected at a level of -3 dB from peak gain. The main beam was then bisected at the -16 dB level and the change in angle was noted as beam skew. The no radome antenna pattern beam skew was compared to the recorded antenna skew of all patterns measured when enclosed by the radome. All of the data was tabulated in the data sheet for Beam Symmetry (Figure 5).

### 6.0 BORESIGHT ERROR

Boresight error measurements were made by calibrating the error slope of a monopulse feed in 0.1 milliradian increments and then

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rotating the radome for 360 degrees. Measurements were made at -20 degrees, 0 degrees and +20 degrees elevation angles of the radome. The data is tabulated in the data sheet for boresight measurements (Figure 7).

Generally, the loss variation through the radome is small and its effect on the boresight error measurement negligible. However, for variations of about 0.5 dB, approximately 0.1 milliradian can be attributed to the loss variation and can be subtracted from the peak boresight error recorded.



APPENDIX A

DOCUMENT D81-31

ELECTROMAGNETIC QUALIFICATION TEST PLAN  
FOR THE  
M10-76-8000 RADOME WITH XP PLATES

 ESSCO

DOCUMENT D81-31

ELECTROMAGNETIC QUALIFICATION TEST PLAN  
FOR THE  
M10-76-8000 RADOME WITH XP PLATES

Prepared For

Naval Research Laboratory  
Washington, D.C. 20375

Contract No. N000173-80-C-0345

ESSCO JOB NO. 1886

ELECTRONIC SPACE SYSTEMS CORPORATION  
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DATE:

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INITIAL RELEASE

Prepared by: *P. L. Smith* Date: *29 July 81*

Approved by: *J. J. Murphy* Date: *30 July 81*

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	REVISION DESCRIPTION	PAGE	APPROVED/DATE

REV. 

DATE: \_\_\_\_\_



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1.0 INTRODUCTION

Electromagnetic tests will be conducted to evaluate the electromagnetic performance of the M10-76-8000 Radome with XP Plates. The radome mounting fixture will allow the radome to be rotated continuously in azimuth and will also allow the radome to be incrementally positioned through a range of approximately  $\pm 25$  degrees in elevation. The following tests will be performed at ESSCO's Electromagnetic Test Facility in Concord, Massachusetts.

2.0 TRANSMISSION LOSS

2.1 Objective

The purpose of this test is to measure the one-way transmission loss through the radome at various radome/antenna look angles.

2.2 Conditions

2.2.1 All tests will be performed at prevailing atmospheric conditions at the ESSCO Test Facility in Concord, Massachusetts.

2.2.2 The equipment will be set up as shown in Figure 1 and allowed to warm up for 30 minutes.

2.3 Test Equipment List

2.3.1 The following test equipment or equivalent will be used for the transmission loss measurements.

- 2.3.1.1 Transmitting Antenna, DICO Model 18", X-Band, L.P. Feed
- 2.3.1.2 Precision Attenuator, H.P. No. X382A
- 2.3.1.3 Signal Source, Alfred No. 650, X-Band
- 2.3.1.4 Gain Standard, DICO No. 14-849
- 2.3.1.5 Frequency Meter, H.P. No. X532B
- 2.3.1.6 Attenuator, PRD No. 195B
- 2.3.1.7 Crystal Mixer, S.A. No. 14-4
- 2.3.1.8 Receiver, S.A. No. 1770
- 2.3.1.9 Recorder, S.A. No. 1580
- 2.3.1.10 Positioner Control, S.A. No. PC4
- 2.3.1.11 Azimuth Positioner, S.A. No. PA44C
- 2.3.1.12 Positioner Control B.G. No. RP1R
- 2.3.1.13 Radome Positioner, ESSCO No. T1866
- 2.3.1.14 Ratiometer, S.A. No. 1833A-20
- 2.3.1.15 Test Antenna, Lockheed No. 7-8A-1000

**E**ssco**2.4**        Test Description

2.4.1        The transmitting antenna and test antenna will be aligned for maximum signal.

2.4.2        Calibration marks will be made on the pattern recorder paper at 0.5, 1.0, 1.5 and 2.0 dB using the precision attenuator.

2.4.3        The recorder chart speed will be set to 360° per chart cycle.

**2.5**        Measurements

2.5.1        The radome will be positioned over the test antenna at three elevation angles, -20°, 0° and + 20°. At each position, continuous transmission loss measurements (360° in azimuth) will be recorded on the antenna pattern recorder.

2.5.2        Three frequencies will be used at each elevation angle designated at "low", Mid" and "high."

**2.6**        Data Sheet

2.6.1        The recorded transmission loss data will be summarized and presented on a data sheet as shown in Figure 2.

**3.0**        SIDELOBE PERTURBATION**3.1**        Objective

The purpose of this test is to measure the change in antenna sidelobes due to the presence of the radome.

**3.2**        Conditions

3.2.1        All tests will be performed at prevailing atmospheric conditions at the ESSCO Test Facility in Concord, Massachusetts.

3.2.2        The equipment will be set up as shown in Figure 1 - Transmission Loss Measurements and allowed to warm up for 30 minutes.

**3.3**        Test Equipment List

3.3.1        The test equipment for the sidelobe measurements will be identical to that used for the transmission loss measurements, paragraph 2.3.

**3.4**        Test Description

3.4.1        The transmitting antenna and test antenna will be aligned for maximum signal. A reference antenna pattern will be recorded without the radome.



3.4.2 Calibration marks will be made on the antenna pattern recorder paper at 3.0, 10.0, 20.0, and 30.0 dB using the precision attenuator.

3.4.3 The recorder chart speed will be set to 90° and 18° per chart cycle.

3.5 Measurements

3.5.1 The radome will be positioned over the test antenna at 3 elevation angles as listed in paragraph 2.5.1. At each elevation angle, the radome will be rotated in azimuth to four discrete positions separated by 90° and the antenna pattern recorded.

3.5.2 Three frequencies will be used at each radome/antenna orientation designated as "low", "mid" and "high."

3.6 Data Sheet

3.6.1 The recorded sidelobe measurements will be summarized and presented on a data sheet as shown in Figure 3.

4.0 BEAM WIDTH CHANGE

4.1 Objective

The purpose of this test is to measure the change in beam width of the test antenna due to the presence of the radome.

4.2 Conditions

4.2.1 All tests will be performed at prevailing atmospheric conditions at the ESSCO Test Facility in Concord, Massachusetts.

4.2.2 The equipment will be set up as shown in Figure 1 - Transmission Loss Measurement and allowed to warm up for 30 minutes.

4.3 Test Equipment List

4.3.1 The test equipment for the beam width measurements will be identical to that used for the transmission loss measurements, paragraph 2.3.

4.4 Test Description

4.4.1 The transmitting antenna and test antenna will be aligned for maximum signal.

4.4.2 Calibration marks will be made on the antenna pattern recorder paper at 3.0, 10.0, 20.0 and 30.0 dB.

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4.4.3 The recorder chart speed will be set to 18° per chart cycle.

4.5 Measurements

4.5.1 The radome will be positioned over the test antenna at 3 elevation angles as listed in paragraph 2.5.1. At each elevation angle, the radome will be rotated in azimuth to four discrete positions separated by 90° and the antenna pattern recorded.

4.5.2 Three frequencies will be used at each radome/antenna orientation designated as "low", "mid" and "high."

4.6 Data Sheet

4.6.1 The recorded sidelobe measurements will be summarized and presented on a data sheet as shown in Figure 4.

5.0 ANTENNA BEAM SYMMETRY

5.1 Objective

The purpose of this test is to measure the change in antenna main beam symmetry due to the presence of the radome.

5.2 Conditions

5.2.1 All tests will be performed at prevailing atmospheric conditions at the ESSCO Test Facility in Concord, Massachusetts.

5.2.2 The equipment will be set up as shown in Figure 1 - Transmission Loss Measurement and allowed to warm up for 30 minutes.

5.3 Test Equipment List

5.3.1 The test equipment for the beam width measurements will be identical to that used for the transmission loss measurements, paragraph 2.3.

5.4 Test Description

5.4.1 The transmitting antenna and test antenna will be aligned for maximum signal.

5.4.2 Calibration marks will be made on the antenna pattern recorder paper at 3.0, 10.0, 20.0 and 30.0 dB.

5.4.3 The recorder chart speed will be set to 18° per chart cycle.

**E**ssco**5.5      Measurements**

5.5.1      The radome will be positioned over the test antenna at 3 elevation angles as listed in paragraph 2.5.1. At each elevation angle, the radome will be rotated in azimuth to four discrete positions separated by 90° and the antenna pattern recorded.

5.5.2      Three frequencies will be used at each radome/antenna orientation designated as "low", "mid" and "high."

**5.6      Data Sheet**

5.6.1      The recorded sidelobe measurements will be summarized and presented on a data sheet as shown in Figure 5.

**6.0      BORESIGHT ERROR****6.1      Objective**

The purpose of this test is to measure the antenna boresight error due to the presence of the radome.

**6.2      Condition**

6.2.1      All tests will be performed at prevailing atmospheric conditions at the ESSCO Test Facility in Concord, Massachusetts.

6.2.2      The equipment will be set up as shown in Figure 6 and allowed to warm up for 30 minutes.

**6.3      Test Equipment List**

6.3.1      The following test equipment, or equivalent, will be used for the boresight error measurements.

6.3.1.1      Transmitting antenna, DICO Model 18", X-Band, L.P. Feed

6.3.1.2      Precision Attenuator, H.P. No. X382A

6.3.1.3      Signal Source, Alfred No. 650, X-Band

6.3.1.4      Gain Standard Horn, DICO No. 14-849

6.3.1.5      Frequency Meter, H.P. No. X532B

6.3.1.6      Attenuator, PRD No. 195B

6.3.1.7      Crystal Mixer, SA No. 14-4

6.3.1.8      Receiver, SA No. 1770

6.3.1.9      Boresight Recorder, SA No. BSR



- 6.3.1.10 Positioner Control, ESSCO No. ATR10
- 6.3.1.11 Boresight Positioner, ESSCO No. 10710
- 6.3.1.12 Ratiometer, SA No. 1833A-20
- 6.3.1.13 Test Antenna, Lockheed No. 7-8A-1000

#### 6.4 Test Description

- 6.4.1 The transmitting antenna and test antenna will be aligned for maximum signal with the antenna covered by the radome.
- 6.4.2 The test antenna will then be moved in azimuth with the precision positioner, and the error slope of the main beam calibrated in 1-milliradian steps of angular movement.
- 6.4.3 The position of the antenna will be adjusted so that a 0.1 milliradian displacement is easily discernible.
- 6.4.4 The recorder chart speed will be set to 360° per chart cycle.

#### 6.5 Measurements

- 6.5.1 The radome will be positioned over the test antenna at 3 elevation angles, -20°, 0°, and +20°. At each position, continuous boresight error measurements (360° in azimuth) will be recorded on the boresight recorder.
- 6.5.2 Three frequencies will be used at each elevation angle designated as "low," "mid" and "high."

#### 6.6 Data Sheet

- 6.6.1 The recorded boresight error measurements will be summarized and presented on a data sheet as shown in Figure 7.

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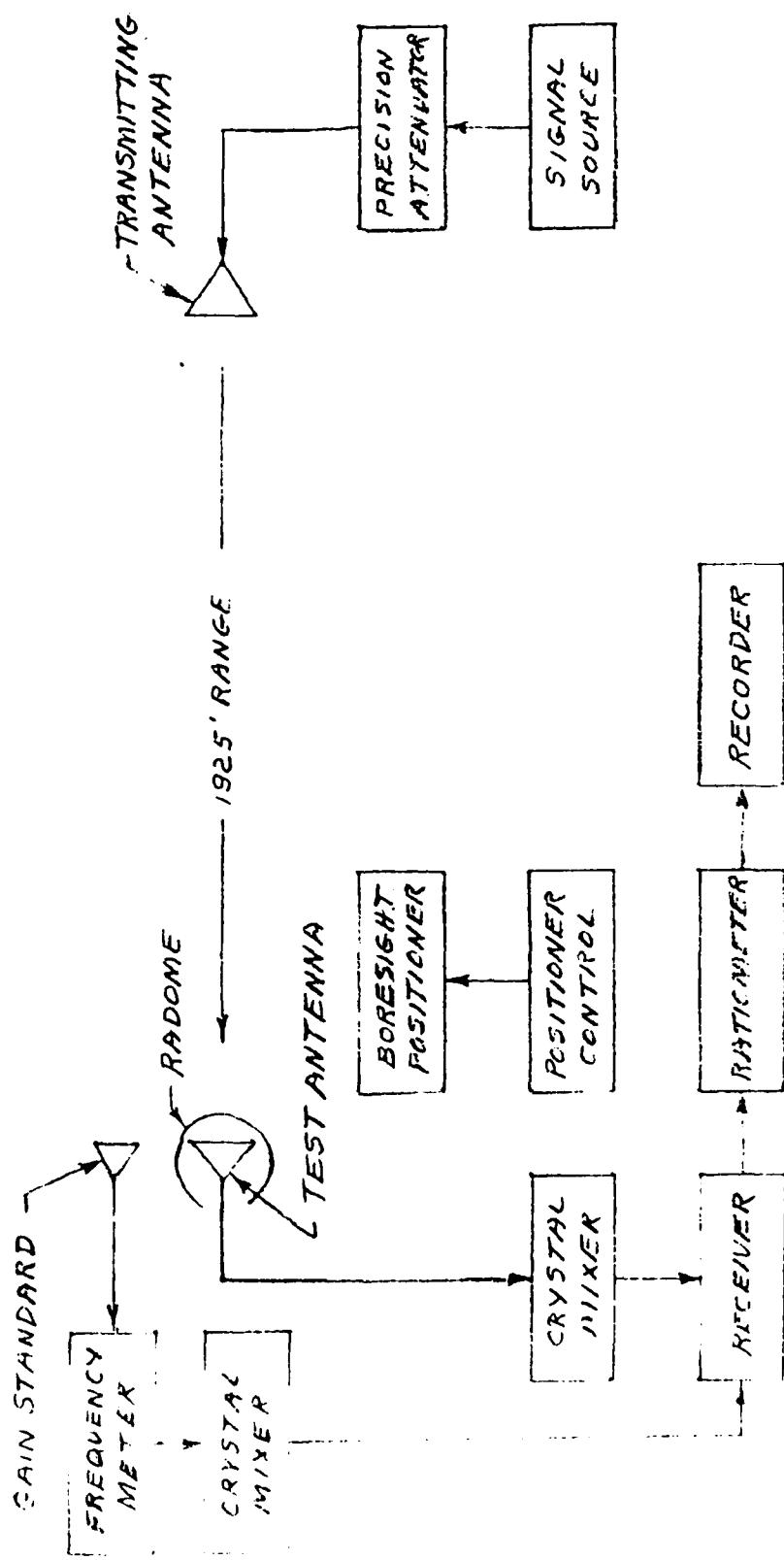


FIGURE 1 - EQUIPMENT USED FOR TRANSMISSION LOSS MEASUREMENT

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DATA SHEET

Procedure No. 2.0

Title: Transmission Loss

Part No. M10-76-8000 Radome with XP Plates

Serial No. 1886-001

Job No. 1886

Test Engineer APS RF TS

Date: 25 AUG 81

TEST RESULTS

Frequency - Low Band

Elevation Angle	Transmission Loss in dB	Specification Limit
-20°	1.10 ± 0.30 dB	N/A
0°	1.10 ± 0.25 dB	N/A
+20°	1.10 ± 0.25 dB	N/A

Frequency - Mid Band

Elevation Angle	Transmission Loss in dB	Specification Limit
-20°	1.20 ± 0.35 dB	N/A
0°	1.20 ± 0.35 dB	N/A
+20°	1.20 ± 0.30 dB	N/A

Frequency - High Band

Elevation Angle	Transmission Loss in dB	Specification Limit
-20°	1.50 ± 0.4 dB	N/A
0°	1.50 ± 0.35 dB	N/A
+20°	1.50 ± 0.35 dB	N/A

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Remarks:

Figure 2 - DATA SHEET FOR TRANSMISSION LOSS MEASUREMENT

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**Esco**DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 24 Aug 81

Frequency low band Radome El Angle 0 Radome Az Angle 0

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna No Radome	Sidelobe With Radome	Specification Limit $\Delta$
-3.5°	25.6	25.5°	N/A + 3.1
-9.5°	34.8	34.8	N/A 0
+3.5°	27.7	25.8	N/A + 1.9
+7.5°	33.4	31.7	N/A + 2.1
			N/A

DATA APPROVAL

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FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

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DATE: \_\_\_\_\_

DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer AP5 RF TC      Date 24 AUG 81

Frequency LOW BAND Radome El Angle 0° Radome Az Angle 90°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit ▷
	No Radome	With Radome	
-3.5	29.6	26.5	N/A +2.1
-9.5	34.8	30.8	N/A +4.0
+3.5	27.7	21.0	N/A +6.7
+7.5	33.8	27.6	N/A +6.2
			N/A

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Remarks:

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV.           
DATE: \_\_\_\_\_



## DATA SHEET

<u>Procedure No.</u>	3.0		
<u>Title:</u>	Sidelobe Perturbations		
<u>Part No.</u>	M10-76-8000 Radome with XP Plates		
<u>Serial No.</u>	1886-001	<u>Job No.</u>	1886
<u>Test Engineer</u>	APS RF TC	<u>Date</u>	24 AUG 81

Frequency Low Band Radome El Angle  $0^\circ$  Radome Az Angle  $180^\circ$

## TEST RESULTS

**DATA APPROVAL**

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FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

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## DATA SHEET

<u>Procedure No.</u>	3.0		
<u>Title:</u>	Sidelobe Perturbations		
<u>Part No.</u>	M10-76-8000 Radome with XP Plates		
<u>Serial No.</u>	1886-001	Job No.	1886
<u>Test Engineer</u>	APS RF TC	Date	24 AUG 81

Frequency Low BAND Radome El Angle 0° Radome Az Angle 270°

## TEST RESULTS

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**Remarks:**



FIGURE 3 - DATA SHEET FOR SIDELobe MEASUREMENTS

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**Esco**DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 24 AUG 81

Frequency Low Band Radome El Angle -20 Radome Az Angle 0°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit ▲
	No Radome	With Radome	
-3.5°	23.6	28.2	N/A + 0.4
-9.5°	34.8	31.0	N/A + 3.8
+3.5°	27.7	25.2	N/A + 2.5
+7.5°	33.8	33.6	N/A + 0.2
			N/A

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FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

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**DATA SHEET**

<u>Procedure No.</u>	3.0		
<u>Title:</u>	Sidelobe Perturbations		
<u>Part No.</u>	M10-76-8000 Radome with XP Plates		
<u>Serial No.</u>	1886-001	Job No.	1886
<u>Test Engineer</u>	AT'S TC RF	Date	24 AUG 81

Frequency Low BAND Radome El Angle - $20^{\circ}$  Radome Az Angle  $90^{\circ}$

## TEST RESULTS

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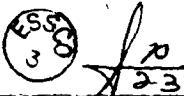


FIGURE 3 - DATA SHEET FOR SIDELobe MEASUREMENTS

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DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 24 AUG 81

Frequency Low Band Radome El Angle -20' Radome Az Angle /50'

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit $\Delta$
	No Radome	With Radome	
-3.5	29.6	29.0	N/A - 0.4
-9.5	34.8	33.3	N/A + 1.5
+3.5	27.7	25.4	N/A + 2.3
+7.5	33.5	32.6	N/A + 1.2
			N/A

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Remarks:

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

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## DATA SHEET

<u>Procedure No.</u>	3.0		
<u>Title:</u>	Sidelobe Perturbations		
<u>Part No.</u>	M10-76-8000 Radome with XP Plates		
<u>Serial No.</u>	1886-001	Job No.	1886
<u>Test Engineer</u>	APS RF TC	Date	24 AUG 51

Frequency Low Band Radome El Angle 26° Radome Az Angle 270°

## TEST RESULTS

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FIGURE 3: DATA SHEET FOR SIDELOBES MEASUREMENTS

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DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer A125 RF TC      Date 24 AUG 81

Frequency LOW BAND    Radome El Angle +20°    Radome Az Angle 0°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit
	No Radome	With Radome	▲
-3.5°	28.6	24.8	N/A - 1.2
-9.5°	34.8	31.8	N/A + 3.0
+3.5°	27.7	31.2	N/A - 3.5
+7.5°	33.5	32.3	N/A + 1.5
			N/A

DATA APPROVAL

ESSCO

CUSTOMER

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3/10/81  
X/23

Remarks:

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV. L) \_\_\_\_\_  
DATE: \_\_\_\_\_

**E**sco

DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 24 AUG 81

Frequency Low BAND Radome El Angle +20° Radome Az Angle 90°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit $\Delta$
	No Radome	With Radome	
-3.5°	38.6	26.0	N/A + 3.6
-4.5°	34.8	31.7	N/A + 3.1
+3.5°	27.7	22.5	N/A + 5.2
+7.5°	33.8	29.5	N/A + 4.0
			N/A

DATA APPROVAL (4) 10  
ESSCO 10  
CUSTOMER 23

Remarks:

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV. LJ  
DATE: \_\_\_\_\_



DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001 Job No. 1886  
Test Engineer APD IPF TC Date 24 AUG 81

Frequency Low BAND Radome El Angle +20° Radome Az Angle 180°

TEST RESULTS

<u>Antenna Az Angle from Beam Peak</u>	<u>Antenna Sidelobe No Radome</u>	<u>Antenna Sidelobe With Radome</u>	<u>Specification Limit</u> ▲
-3.5°	29.6	29.8	N/A - 1.2
-9.5°	34.8	30.4	N/A + 4.4
+3.5°	27.7	26.4	N/A + 1.3
+7.5°	33.8	34.0	N/A - 0.2
			N/A

DATA APPROVAL

ESSCO  
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10  
23

CUSTOMER

Remarks:

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV.     
DATE: \_\_\_\_\_



DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 24 AUG 81

Frequency low BAND    Radome El Angle +20°    Radome Az Angle 270°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit △
	No Radome	With Radome	
-3.5°	25.6	25.7	N/A + 2.9
-9.5°	34.8	32.5	N/A + 2.3
+3.5°	27.7	26.0	N/A + 1.7
+7.5	33.9	33.3	N/A + 0.5°
			N/A

DATA APPROVAL   
ESSCO  10  
CUSTOMER

Remarks: \_\_\_\_\_

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV.   

DATE: \_\_\_\_\_

**Esco**DATA SHEETProcedure No. 3.0Title: Sidelobe PerturbationsPart No. M10-76-8000 Radome with XP PlatesSerial No. 1886-001 Job No. 1886Test Engineer APS RF TC Date 25 1966 81Frequency MID BAND Radome El Angle 0° Radome Az Angle 0°TEST RESULTS

<u>Antenna Az Angle from Beam Peak</u>	<u>Antenna Sidelobe</u>		<u>Specification Limit</u>
	<u>No Radome</u>	<u>With Radome</u>	<u>▲</u>
- 3.5°	25.7	25.9	N/A - 1.2
- 8.5°	35.3	36.4	N/A + 3.9
+ 3.5°	25.6	23.2	N/A + 2.4
+ 5.5°	29.2	26.6	N/A + 1.6
			N/A

DATA APPROVAL

ESSCO

CUSTOMER

Remarks:

FIGURE 3 - DATA SHEET FOR SIDEBLOBE MEASUREMENTS

REV. 

DATE: \_\_\_\_\_

**Esco****DATA SHEET**

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 25 AUG 81

Frequency MID BAND    Radome El Angle 0    Radome Az Angle 90°

**TEST RESULTS**

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit △
	No Radome	With Radome	
-3.5°	25.7	23.2	N/A + 3.5°
-8.5°	35.3	26.2	N/A + 9.1
+3.5°	25.6	19.8	N/A + 5.8
+5.5°	28.2	23.6	N/A + 4.6
			N/A

**DATA APPROVAL**

ESSCO

CUSTOMER

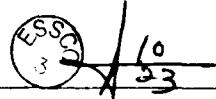

Remarks:

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV.     
DATE: \_\_\_\_\_

**Esco**

DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RT TC      Date 22 ALG 81

Frequency MID BAND      Radome El Angle 0°      Radome Az Angle 180°

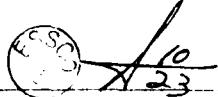
TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit
	No Radome	With Radome	
- 3.5°	25.7	27.5	N/A - 2.1
- 8.5°	35.3	29.5	N/A + 6.8
+ 3.5°	25.6	23.3	N/A + 2.3
+ 5.5°	25.2	32.5	N/A - 4.3
			N/A

DATA APPROVAL

ESSCO

CUSTOMER

  
10/23

Remarks:

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

**Esco**DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer AP - NL      Date 20 APR 81

Frequency 1100 MHz      Radome El Angle 15°      Radome Az Angle 210°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe No Radome	Antenna Sidelobe With Radome	Specification Limit
-3.5°	25.7	22.5°	N/A + 2.5
-5.5°	33.3	37.5	N/A + 1.5
+3.5°	25.6	20.4	N/A + 1.6
+5.5°	25.2	23.6	N/A + 1.6
			N/A

DATA APPROVAL

ESSCO

CUSTOMER

Remarks:

FIGURE 3 DATA SHEET FOR SIDELOBE MEASUREMENTS

REV.     
DATE: \_\_\_\_\_



DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 25 1966 31

Frequency MID BAND Radome El Angle 20 Radome Az Angle 0°

TEST RESULTS

Antenna Az Angle from Beam Peak	No Radome	With Radome	Specification Limit △
-3.5°	25.7	24.4	N/A + .3
-8.5°	35.3	29.0	N/A + .3
+3.5°	25.6	22.0	N/A + .8
+8.5°	25.2	31.0	N/A ± .5
			N/A

DATA APPROVAL

ESSCO

CUSTOMER

Remarks:

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV. L

DATE: \_\_\_\_\_

**E**sscoDATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APD RF TC      Date 25 AUG 81

Frequency MID BAND    Radome El Angle 30°    Radome Az Angle 90°

TEST RESULTS

<u>Antenna Az Angle from Beam Peak</u>	<u>Antenna Sidelobe</u>		<u>Specification Limit</u> ▲
	<u>No Radome</u>	<u>With Radome</u>	
3.5°	25.7	21.3	N/A + 4.4
-3.5°	35.3	32.2	N/A + 3.1
+3.5°	25.6	25.0	N/A + 0.6
+37.5°	25.2	26.7	N/A + 1.5
			N/A

DATA APPROVAL

ESSCO

CUSTOMER

Remarks:

FIGURE 3 DATA SHEET FOR SIDELOBE MEASUREMENTS

REV.     
DATE: \_\_\_\_\_



DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer ANS RF TC      Date 22 AUG 81

Frequency MID BAND Radome El Angle -20° Radome Az Angle / 8°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe No Radome	Antenna Sidelobe With Radome	Specification Limit
-3.5	25.7	23.6	N/A + 2.1
-5.5	35.3	30.0	N/A + 5.3
+3.5	25.6	23.2	N/A + 2.4
+5.5	28.2	32.4	N/A - 4.2
			N/A

DATA APPROVAL

ESSCO  
CUSTOMER

Remarks:

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV. 

DATE: \_\_\_\_\_

**ESCO**DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer AFM RF TL      Date 25 NOV 81

Frequency 1410 BAND Radome El Angle -20° Radome Az Angle 270°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit ▲
	No Radome	With Radome	
-3.5°	35.7	24.3	N/A + .4
-8.5°	35.3	25.2	N/A + .0.1
+3.5°	35.6	20.4	N/A + .2
+8.5°	28.2	25.2	N/A + .6
			N/A

DATA APPROVAL


ESSCO

CUSTOMER

Remarks:

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV.  \_\_\_\_\_  
DATE: \_\_\_\_\_

**Esco**

DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer AHS IPF TC      Date 25 AUG 81

Frequency MID BAND      Radome El Angle +2°      Radome Az Angle 0°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit
	No Radome	With Radome	△
-3.5°	25.7	25.4	N/A + 3.7
-5.5°	35.3	33.8	N/A + 1.5
+3.5°	25.6	23.5	N/A + 3.1
+5.5°	25.2	24.9	N/A + 1.4
			N/A

DATA APPROVAL   
ESSCO   
CUSTOMER

Remarks: \_\_\_\_\_

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV.

**DATE:** \_\_\_\_\_

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**DATA SHEET**

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 25 AUG 81

Frequency MID BAND Radome El Angle +20° Radome Az Angle 90°

## TEST RESULTS

**DATA APPROVAL**

ESSCO

**CUSTOMER**

### Remarks :

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV.   

DATE: \_\_\_\_\_

DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer AND RF TC      Date 25 AUG 81

Frequency MID BAND    Radome El Angle +20°    Radome Az Angle +80°

TEST RESULTS

<u>Antenna Az Angle from Beam Peak</u>	<u>Antenna Sidelobe</u>	<u>Specification Limit</u>
	No Radome	With Radome
-3.5°	25.7	N/A + 1.7
-8.5	35.3	N/A + 3.7
+3.5°	25.6	N/A - 5.0
+5.5°	28.2	N/A + 5.0
		N/A

DATA APPROVAL

ESSCO

CUSTOMER

Remarks:

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV. 

DATE: \_\_\_\_\_

**Esco****DATA SHEET**

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 25 AUG 81

Frequency MID BAND Radome El Angle +20° Radome Az Angle 370°

**TEST RESULTS**

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit $\Delta$
	No Radome	With Radome	
-3.5°	35.7	32.0	N/A + 3.7
-5.5°	35.3	34.4	N/A + 0.9
+3.5°	35.6	23.0	N/A + 3.6
+5.5°	38.2	36.4	N/A + 1.8
			N/A

**DATA APPROVAL**

ESSCO

CUSTOMER

Remarks: \_\_\_\_\_

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV. 

DATE: \_\_\_\_\_

**Esco**DATA SHEETProcedure No. 3.0Title: Sidelobe PerturbationsPart No. M10-76-8000 Radome with XP PlatesSerial No. 1886-001 Job No. 1886Test Engineer APS RF TC Date 24 AUG 81Frequency HIGH BAND Radome El Angle 0° Radome Az Angle 0°TEST RESULTS

<u>Antenna Az Angle from Beam Peak</u>	<u>Antenna Sidelobe</u>		<u>Specification Limit</u> $\Delta$
	<u>No Radome</u>	<u>With Radome</u>	
-5.0	27.4	23.2	N/A + 4.2
-10.0	34.7	29.3	N/A + 5.4
+3.5	25.1	23.4	N/A + 1.7
+5.0	28.4	32.4	N/A - 4.0
			N/A

DATA APPROVAL

ESSCO




CUSTOMER

Remarks:

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

**ESCO**REV. 

DATE: \_\_\_\_\_

DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 24 AUG 81

Frequency HIGH BAND Radome El Angle 0° Radome Az Angle 90°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit △
	No Radome	With Radome	
-5.0	27.4	21.0	N/A + 6.4
-10.0	34.7	31.8	N/A + 2.9
+3.5	25.1	19.7	N/A + 5.4
+5.0	28.4	22.3	N/A + 6.1
			N/A

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CUSTOMER

Remarks: \_\_\_\_\_

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FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV. 

DATE: \_\_\_\_\_

**Esco**DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 24 AUG 81

Frequency HIGH BAND Radome El Angle 0° Radome Az Angle 180°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit △
	No Radome	With Radome	
-5.0	27.4	24.0	N/A + 3.4
-10.0	34.7	31.0	N/A + 3.7
+3.5	25.1	21.0	N/A + 4.1
+5.0	28.4	29.2	N/A - 0.8
			N/A

DATA APPROVAL

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CUSTOMER

Remarks:


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FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV. 

DATE: \_\_\_\_\_

**Esco**DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 24 AUG 81

Frequency HIGH BAND    Radome El Angle 0°    Radome Az Angle 270°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit ▲
	No Radome	With Radome	
-5.0	27.4	22.8	N/A + 4.6
-10.0	34.7	26.4	N/A + 8.3
+3.5	25.1	19.0	N/A + 4.1
+5.0	28.4	25.2	N/A + 3.2
			N/A

DATA APPROVAL

ESSCO

CUSTOMER

Remarks:

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

**Pasco**

REV.  \_\_\_\_\_  
DATE: \_\_\_\_\_

**DATA SHEET**

<u>Procedure No.</u>	3.0		
<u>Title:</u>	Sidelobe Perturbations		
<u>Part No.</u>	M10-76-8000 Radome with XP Plates		
<u>Serial No.</u>	1886-001	Job No.	1886
<u>Test Engineer</u>	APS RF TC	Date	24 AUG 81

Frequency HIGH BAND Radome El Angle -20 Radome Az Angle 0

## TEST RESULTS

**DATA APPROVAL**

ESSCO

CUSTOMER

### **Remarks:**

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV. 

DATE: \_\_\_\_\_

**E**scoDATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 24 AUG 81

Frequency HIGH BAND    Radome El Angle -20°    Radome Az Angle 90°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit △
	No Radome	With Radome	
-5.0	27.4	31.0	N/A + 6.4
-10.0	34.7	28.8	N/A + 5.9
+3.5°	25.1	22.2	N/A + 3.9
+5.0	28.4	24.4	N/A + 3.8
			N/A

DATA APPROVAL

ESSCO

CUSTOMER

Remarks:

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV. 

DATE: \_\_\_\_\_

**Esco**DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 24 AUG 81

Frequency HIGH BAND Radome El Angle -20° Radome Az Angle 180°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit ▲
	No Radome	With Radome	
-5.0	37.4	24.0	N/A + 3.4
-10.0	34.7	31.0	N/A + 3.7
+3.5	25.1	20.6	N/A + 4.5
+5.0	28.4	30.4	N/A - 2.0
			N/A

DATA APPROVAL

ESSCO

CUSTOMER

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

**Esco**DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 24 AUG 81

Frequency HIGH BAND Radome E1 Angle -20° Radome Az Angle 270°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit ▲
	No Radome	With Radome	
-5.0	27.4	21.6	N/A + 5.8
-10.0	34.7	29.6	N/A + 5.1
+3.5	25.1	19.4	N/A + 5.7
+5.0	28.4	22.6	N/A + 5.8
			N/A

DATA APPROVAL

ESSCO


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CUSTOMER

Remarks: \_\_\_\_\_

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FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV. 

DATE: \_\_\_\_\_

**Esco**DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886 -001      Job No. 1886  
Test Engineer APS RF SC      Date 24 AUG 81

Frequency HIGH BAND    Radome El Angle +20°    Radome Az Angle 0°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit $\Delta$
	No Radome	With Radome	
-5.0	37.4	35.0	N/A + 3.4
-10.0	34.7	30.4	N/A + 4.3
+3.5	25.1	22.0	N/A + 3.1
+5.0	28.4	26.6	N/A + 1.8
			N/A

DATA APPROVAL

ESSCO



CUSTOMER

Remarks:

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV.

**DATE:** \_\_\_\_\_

**Fasco**

## DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 24 AUG 81

Frequency HIGH BAND Radome El Angle  $+20^\circ$  Radome Az Angle  $90^\circ$

## TEST RESULTS

**DATA APPROVAL**

ESSCO

**CUSTOMER**

**Remarks:** \_\_\_\_\_

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV. 

DATE: \_\_\_\_\_

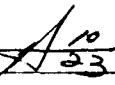
**esco**DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 24 AUG 81

Frequency HIGH BAND Radome El Angle +30° Radome Az Angle 180°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit ▲
	No Radome	With Radome	
-5.0	27.4	28.2	N/A - 0.8
-10.0	34.7	39.6	N/A + 6.1
+3.5	25.1	23.0	N/A + 2.1
+5.0	28.4	31.8	N/A - 3.4
			N/A

DATA APPROVAL    
 ESSCO      CUSTOMER

Remarks: \_\_\_\_\_  
 \_\_\_\_\_

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV. 

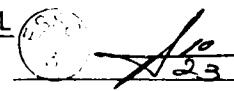
DATE: \_\_\_\_\_

**Esco**DATA SHEETProcedure No. 3.0Title: Sidelobe PerturbationsPart No. M10-76-8000 Radome with XP PlatesSerial No. 1886-001 Job No. 1886Test Engineer ANS RF TCDate 24 AUG 81Frequency HIGH BAND Radome El Angle +20° Radome Az Angle -20°TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit ▲
	No Radome	With Radome	
-5.0	27.4	26.6	N/A + 0.8
-10.0	34.7	32.6	N/A + 2.1
+3.5	25.1	23.2	N/A + 1.9
+5.0	28.4	26.0	N/A + 2.4
			N/A

DATA APPROVAL

ESSCO



CUSTOMER

Remarks:

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

REV. 

DATE: \_\_\_\_\_

**Esco**DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 19 AUG 81

Frequency MID BAND    Radome El Angle 0°    Radome Az Angle 0°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit
	No Radome	With Radome	△
-3.5°	25.7	22.6	N/A + 3.1
-8.5°	35.3	26.9	N/A + 8.5
+3.5°	25.6	23.6	N/A + 2.0
+5.5°	28.2	29.8	N/A - 0.6
			N/A

DATA APPROVAL

ESSCO

CUSTOMER

Remarks:

1. Sidelobe measurements were taken at the specified angles.

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

**Esco**REV. 

DATE: \_\_\_\_\_

DATA SHEET

Procedure No. 3.0  
Title: Sidelobe Perturbations  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer APS RF TC      Date 19 AUG 81

Frequency MID BAND Radome El Angle 0° Radome Az Angle 0°

TEST RESULTS

Antenna Az Angle from Beam Peak	Antenna Sidelobe		Specification Limit $\Delta$
	No Radome	With Radome	
-3.5	25.7	22.6	N/A + 3.1
-8.8	35.3	30.6	N/A + 4.7
+3.5	25.6	22.8	N/A + 2.8
+5.5	28.2	27.3	N/A + 0.4
			N/A

DATA APPROVAL

ESSCO

CUSTOMER

Remarks:

MICHAEL ELLIOTT WILSON, DATE 18 AUG 81

FIGURE 3 - DATA SHEET FOR SIDELOBE MEASUREMENTS

## DATA SHEET

Procedure No.

Title Beam Width Change

Part No. M10-26-000 Radome with AP Plates

Serial No. 1886-001 Job No 1886

Test Engineer APPS RF TCDate: 25 AUG 81

## TEST RESULTS

## Frequency - Low Band

Elevation Angle	0°	Azimuth Angle 90°	180°	270°	No Radome Beam Width	Specification Limit
-20°	+.23°	+.03°	+.22°	+.04°	1.40°	N/A
0°	+.15°	+.08°	+.19°	+.08°	1.40°	N/A
+20°	+.13°	+.15°	+.18°	+.10°	1.40°	N/A

## Frequency - Mid Band

Elevation Angle	0°	Azimuth Angle 90°	180°	270°	No Radome Beam Width	Specification Limit
-20°	+.10°	0	+.08°	0	1.30°	N/A
0°	+.06°	0	+.09°	+.03°	1.30°	N/A
+20°	+.03°	+.02°	+.02°	+.04°	1.30°	N/A

## Frequency - High Band

Elevation Angle	0°	Azimuth Angle 90°	180°	270°	No Radome Beam Width	Specification Limit
-20°	+.15°	0	+.17°	+.01°	1.42°	N/A
0°	+.13°	0	+.23°	+.05°	1.42°	N/A
+20°	+.07°	+.08°	+.14°	+.03°	1.42°	N/A

## DATA APPROVAL

ESSCO  
CUSTOMER

Remarks:

FIGURE 4 - DATA SHEET FOR BEAM WIDTH MEASUREMENTS

ESSCO

DATA SHEET

Procedure No. 5.0  
Title: Antenna Beam Symmetry (Beam Skew at -16 dB)  
Part No. M10-76-8000 Radome with XP Plates  
Serial No. 1886-001      Job No. 1886  
Test Engineer: APS RF TC      Date: 25 AUG 81

TEST RESULTSFrequency - Low Band

Elevation Angle	Azimuth Angle				No Radome Symmetry	Specification Limit
	0°	90°	180°	270°		
-20°	+.10°	+.06°	+.06°	+.03°	+.08°	N/A
0°	+.04°	+.03°	+.10°	+.06°	+.08°	N/A
+20°	+.15°	+.13°	+.08°	+.06°	+.08°	N/A

Frequency - Mid Band

Elevation Angle	Azimuth Angle				No Radome Symmetry	Specification Limit
	0°	90°	180°	270°		
-20°	+.15°	+.03°	+.10°	+.03°	+.04°	N/A
0°	+.09°	+.05°	+.18°	+.05°	+.04°	N/A
+20°	+.19°	+.02°	-.04°	-.02°	+.04°	N/A

Frequency - High Band

Elevation Angle	Azimuth Angle				No Radome Symmetry	Specification Limit
	0°	90°	180°	270°		
-20°	+.10°	+.08°	+.10°	+.05°	-.02°	N/A
0°	+.07°	+.06°	+.12°	+.02°	-.02°	N/A
+20°	+.19°	+.07°	+.03°	+.08°	-.02°	N/A

DATA APPROVAL

ESSCO

CUSTOMER

Remarks:

Figure 5 - DATA SHEET FOR BEAM SYMMETRY MEASUREMENTS

REV. \_\_\_\_\_  
DATE: \_\_\_\_\_

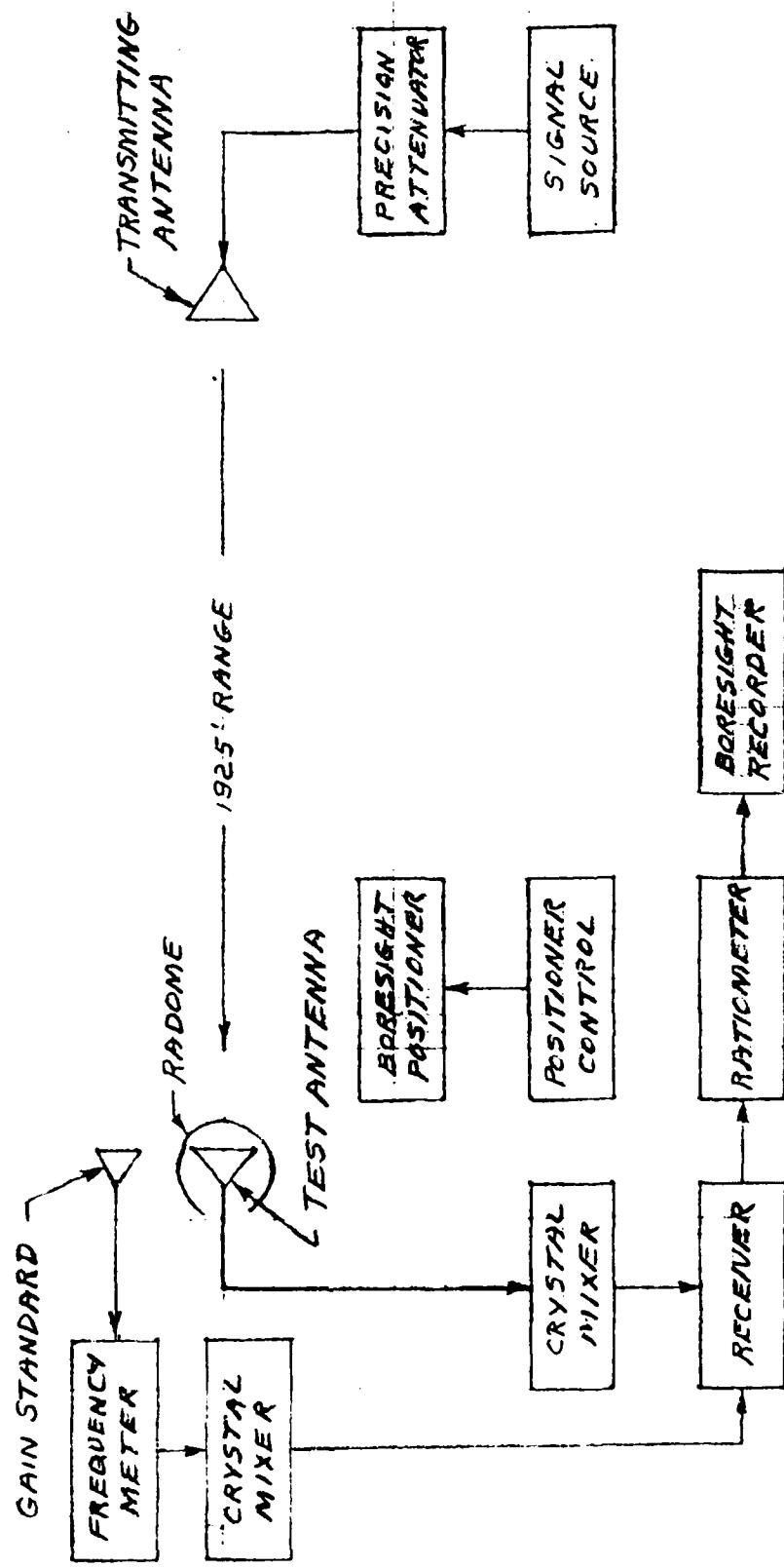


FIGURE 6 - EQUIPMENT USED FOR BORESIGHT MEASUREMENTS

## DATA SHEET

Procedure No. Q.Q  
 Title: Boresight Error  
 Part No. M10-76-8000 Radome with XP Plates  
 Serial No. 1886-001 Job No. 1886  
 Test Engineer APS RF TC Date 25 AUG 81

TEST RESULTSFrequency - Low Band

Elevation Angle	Maximum Boresight in Milliradians	Specification Limit
-20°	± 0.75	N/A
0°	± 0.64	N/A
+20°	± 0.58	N/A

Frequency - Mid Band

Elevation Angle	Maximum Boresight in Milliradians	Specification Limit
-20°	± 0.75	N/A
0°	± 0.54	N/A
+20°	± 0.70	N/A

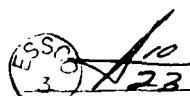
Frequency - High Band

Elevation Angle	Maximum Boresight in Milliradians	Specification Limit
-20°	± 0.81	N/A
0°	± 0.70	N/A
+20°	± 0.78	N/A

DATA APPROVAL

ESSCO

CUSTOMER



Remarks:

Figure 7 - DATA SHEET FOR BORESIGHT MEASUREMENTS



APPENDIX B

CHART RECORDINGS

RECORDED DATA

Pattern No.	Description				Page No.
1	Low Band - No Radome Reference Pattern				1
2	Low Band - Radome On, 0° Az, 0° E1				2
3	Low Band - Radome On, 90° Az, 0° E1				3
4	Low Band - Radome On, 180° Az, 0° E1				4
5	Low Band - Radome On, 270° Az, 0° E1				5
6	Low Band - Radome On, 0° Az, -20° E1				6
7	Low Band - Radome On, 90° Az, -20° E1				7
8	Low Band - Radome On, 180° Az, -20° E1				8
9	Low Band - Radome On, 270° Az, -20° E1				9
10	Low Band - Radome On, 0° Az, +20° E1				10
11	Low Band - Radome On, 90° Az, +20° E1				11
12	Low Band - Radome On, 180° Az, +20° E1				12
13	Low Band - Radome On, 270° Az, +20° E1				13
14	Low Band - Radome On, 0° Az, 0° E1, 360° Pattern				14
15	Low Band - No Radome, 0° Az, 0° E1, 360° Pattern				15
16	Low Band - Transmission Loss and Calibration				16
17	Low Band - Loss Variability, 360° Az scan at 0° E1				17
18	Low Band - Loss Variability, 360° Az scan at -20° E1				18
19	Low Band - Loss Variability, 360° Az scan at +20° E1				19
20	Low Band - Boresight Error, 360° az scan at 0° E1				20
21	Low Band - Boresight Error, 360° Az scan at -20° E1				21
22	Low Band - Boresight Error, 360° Az scan at +20° E1				22
23	Mid Band - No Radome Reference Pattern				23
24	Mid Band - Radome On, 0° Az, 0° E1				24
25	Mid Band - Radome On, 90° Az, 0° E1				25
26	Mid Band - Radome On, 180° Az, 0° E1				26
27	Mid Band - Radome On, 270° Az, 0° E1				27
28	Mid Band - Radome On, 0° Az, -20° E1				28
29	Mid Band - Radome On, 90° Az, -20° E1				29
30	Mid Band - Radome On, 180° Az, -20° E1				30
31	Mid Band - Radome On, 270° Az, -20° E1				31
32	Mid Band - Radome On, 0° Az, +20° E1				32
33	Mid Band - Radome On, 90° Az, +20° E1				33
34	Mid Band - Radome On, 180° Az, +20° E1				34
35	Mid Band - Radome On, 270° Az, +20° E1				35
36	Mid Band - Radome On, 0° Az, 0° E1, 360° Pattern				36
37	Mid Band - No Radome, 0° Az, 0° E1, 360° Pattern				37
38	Mid Band - Transmission Loss and Calibration				38
39	Mid Band - Loss Variability, 360° Az scan at 0° E1 Angle				39
40	Mid Band - Loss Variability, 360° Az scan at -20° E1 Angle				40
41	Mid Band - Loss Variability, 360° Az scan at +20° E1 Angle				41
42	Mid Band - Boresight Error, 360° Az scan at 0° E1				42
43	Mid Band - Boresight Error, 360° Az scan at -20° E1				43
44	Mid Band - Boresight Error, 360° Az scan at +20° E1				44



Pattern No.	Description	Page No.
45	High Band - No Radome Reference Pattern	45
46	High Band - Radome On, 0° Az, 0° El	46
47	High Band - Radome On, 90° Az, 0° El	47
48	High Band - Radome On, 180° Az, 0° El	48
49	High Band - Radome On, 270° Az, 0° El	49
50	High Band - Radome On, 0° Az, -20° El	50
51	Hi-' Band - Radome On, 90° Az, -20° El	51
52	Hig.. Band - Radome On, 180° Az, -20° El	52
53	High Band - Radome On, 270° Az, -20° El	53
54	High Band - Radome On, 0° Az, +20° El	54
55	High Band - Radome On, 90° Az, +20° El	55
56	High Band - Radome On, 180° Az, +20° El	56
57	High Band - Radome On, 270° Az, +20° El	57
58	High Band - Radome On, 0° Az, 0° El, 360° Pattern	58
59	High Band - No Radome, 0° az, 0° El, 360° Pattern	59
60	High Band - Transmission Loss and Calibration	60
61	High Band - Loss Variability, 360° Az scan at 0° El	61
62	High Band - Loss Variability, 360° Az scan at -20° El	62
63	High Band - Loss Variability, 360° Az scan at +20° El	63
64	High Band - Boresight Error, 360° Az scan at 0° El	64
65	High Band - Boresight Error, 360° Az scan at -20° El	65
66	High Band - Boresight Error, 360° Az scan at +20° El	66
67	Mid Band - XP Plate Area, 0° Az, 0° El	67
68	Mid Band - Space Frame Area, 0° Az, 0° El	68
69	Low Band - Transmission Loss in XP Plate Area, 360° Az scan	69
70	Mid Band - Transmission Loss in XP Plate Area, 360° Az scan	70
71	High Band - Transmission Loss in XP Plate Area, 360° Az scan	71

293678

ENGR

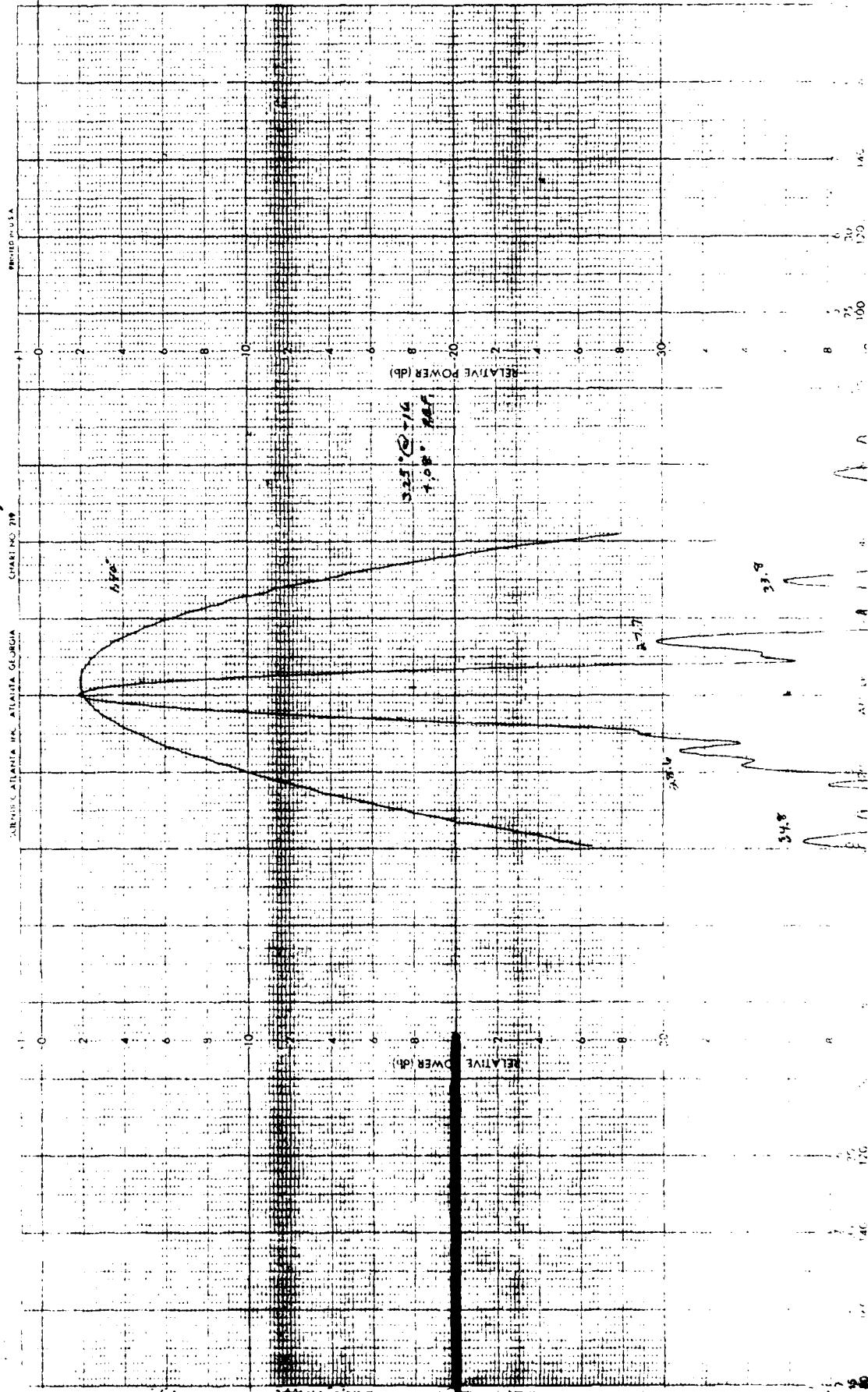
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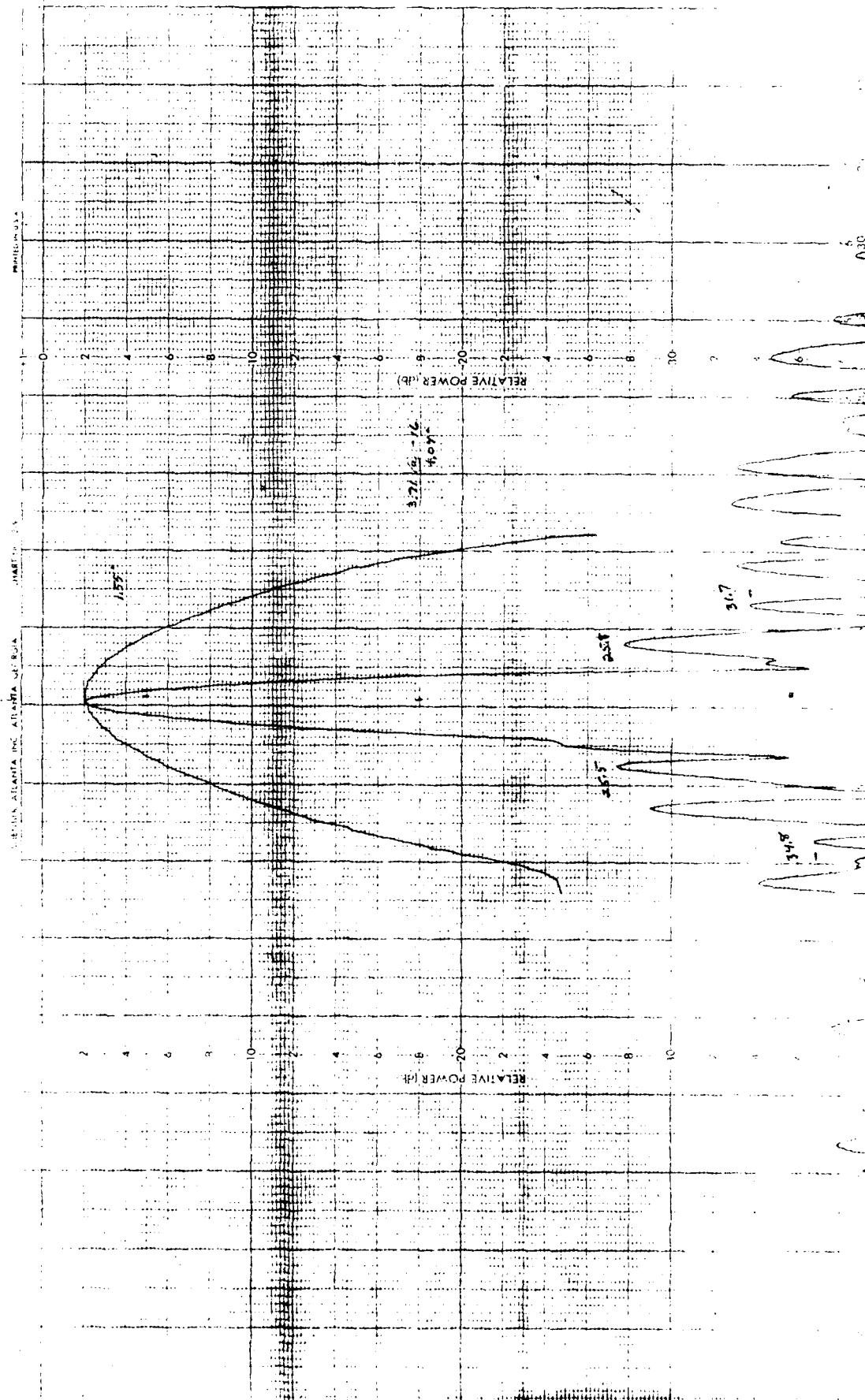
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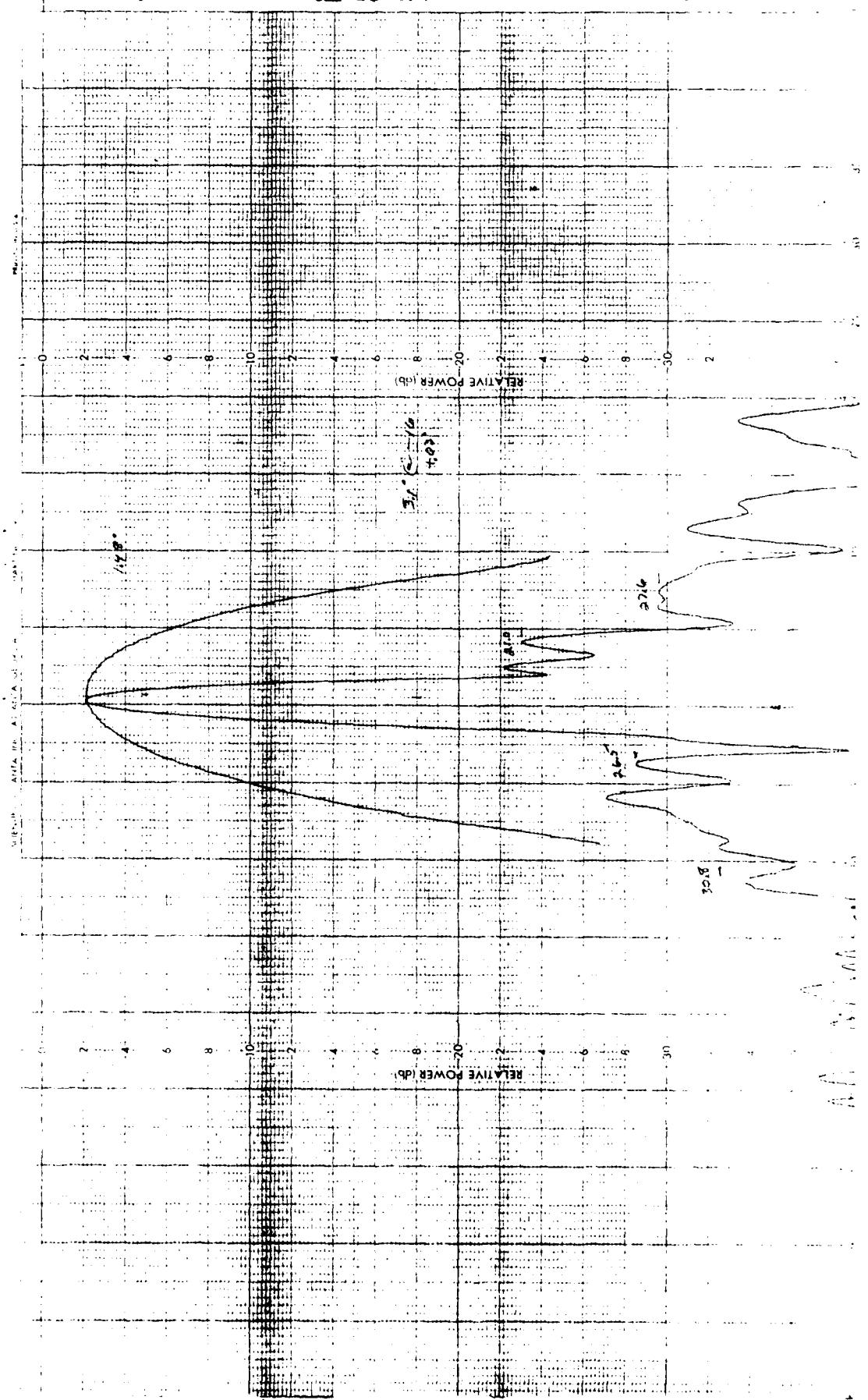
81

PROJECT 1896-CG  
REMARKS LOW BAND - NO RESPONSE  
C-AZ Q-EL

2 - FEMARMS - OUT OF SERVICE RDNOE ON 0-REI  
203663 ENGR APPS RFE TC DATE 24 NOV 68  
1596-06



293664  
DATE 24 AUG 81  
PROJECT 1986-06  
-E - DYNAMIC LEVEL RECORDING ON  
ENGR AT&T RFE TEC

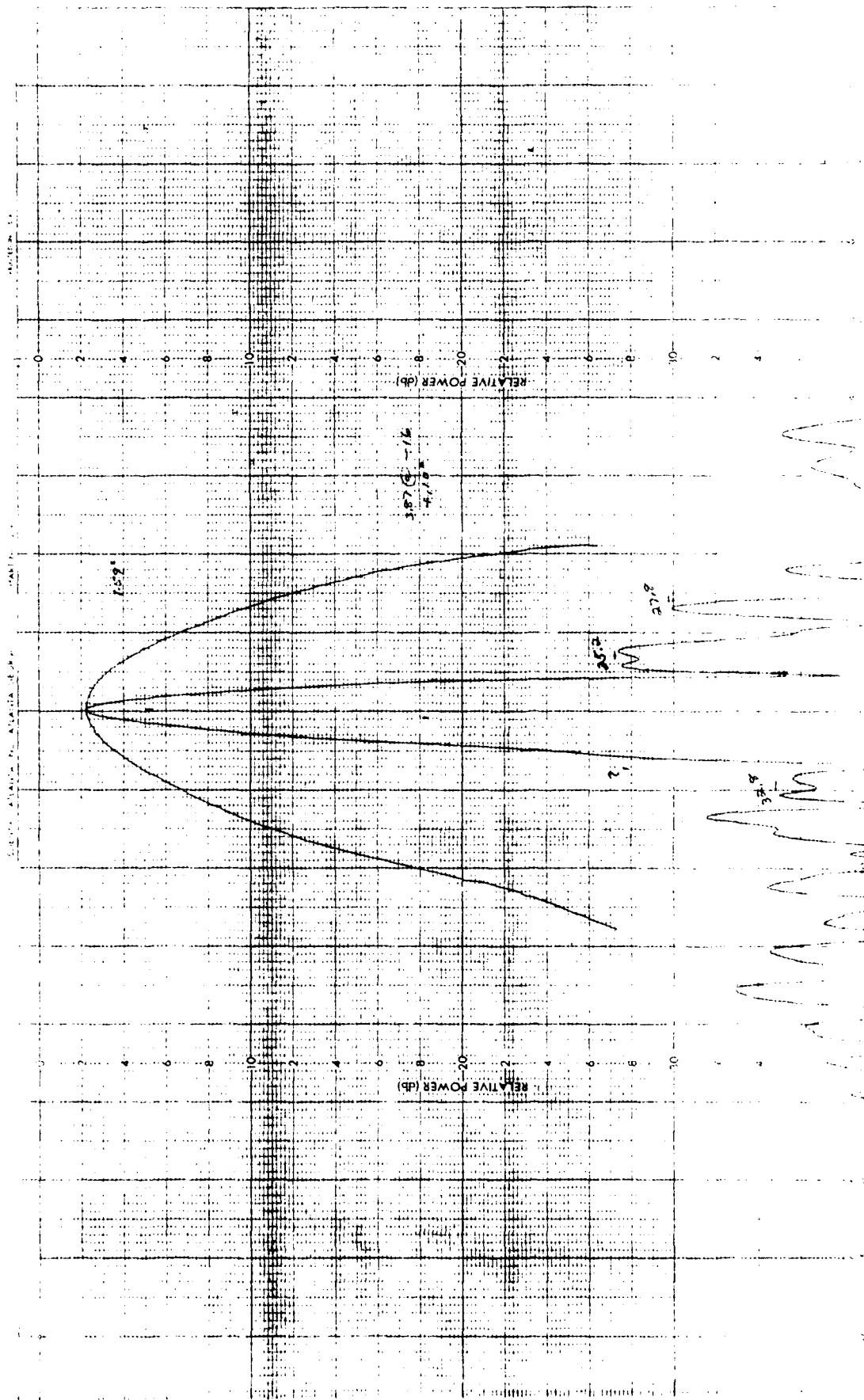


18C.AZ C.G.L  
213665 296-CG

18C.AZ C.G.L

18C.AZ C.G.L

LNGR APS HF TC DATE 21 NOV 81



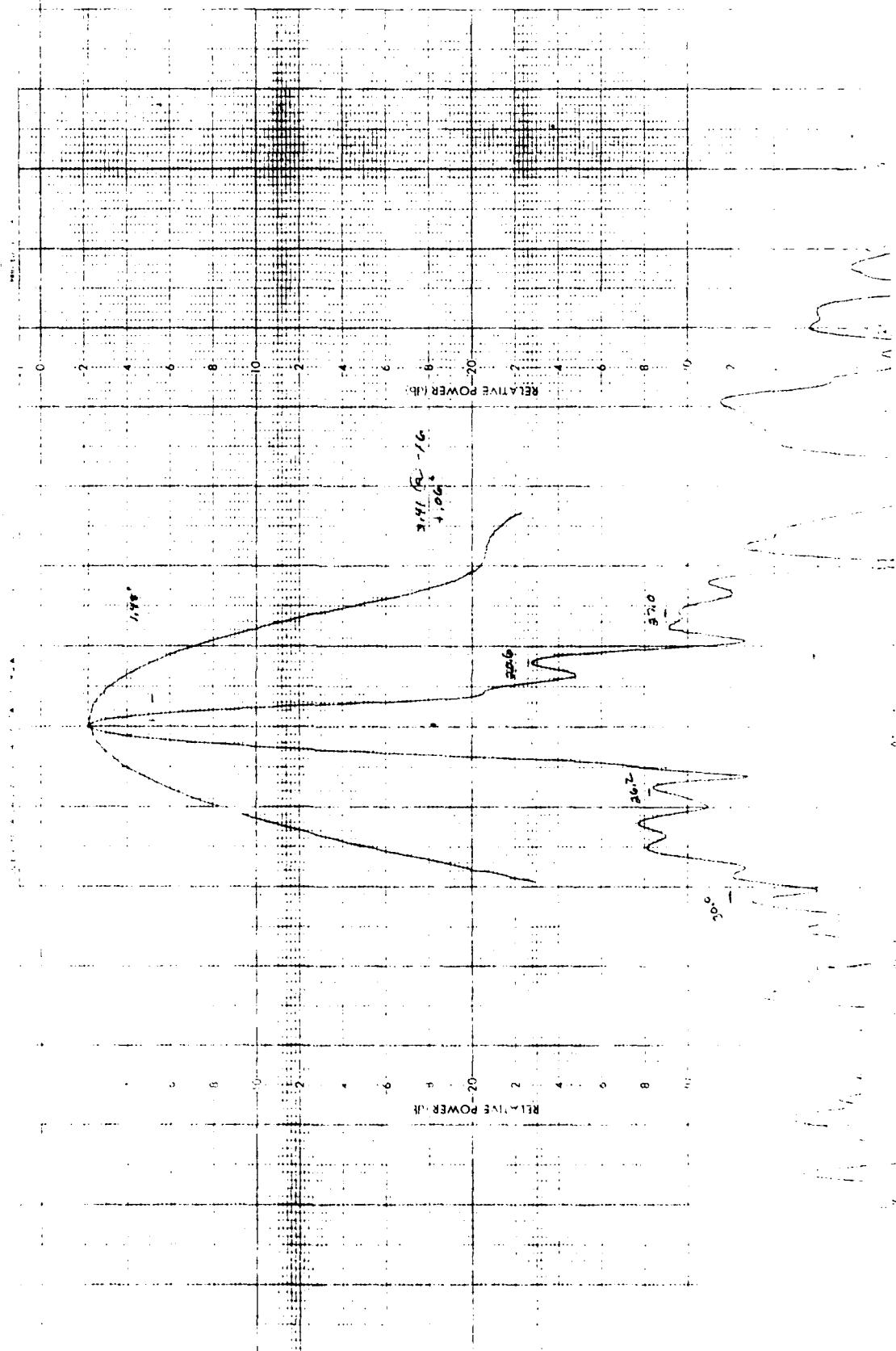
270 42

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293666

ENG M725 RFE TC DATE 25 APR 81

SERIAL NO. 293666 ENGINE NO. M725 RFE DATE 25 APR 81



53671

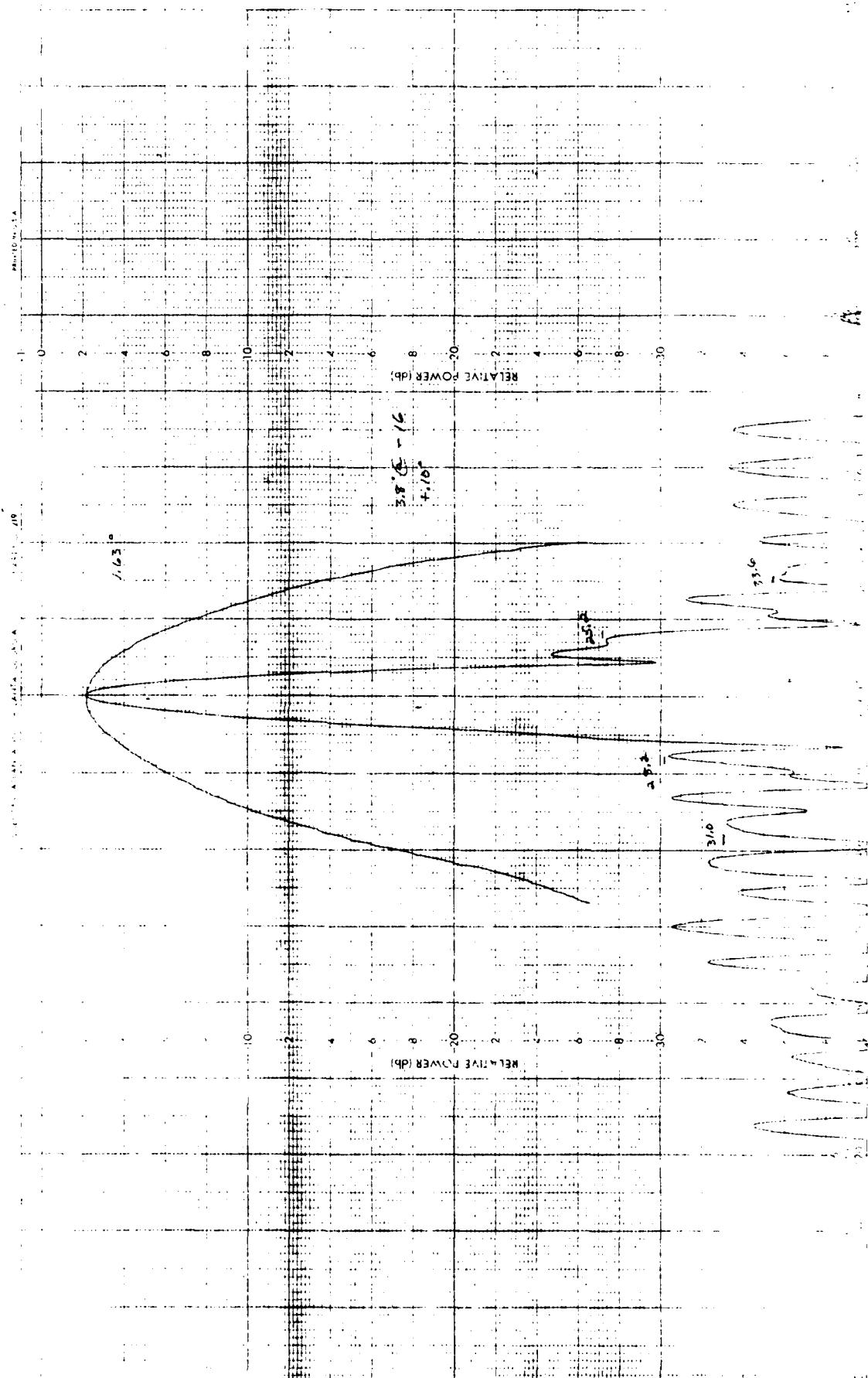
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ENGR APS RF TC

DATE 24 AUG 81

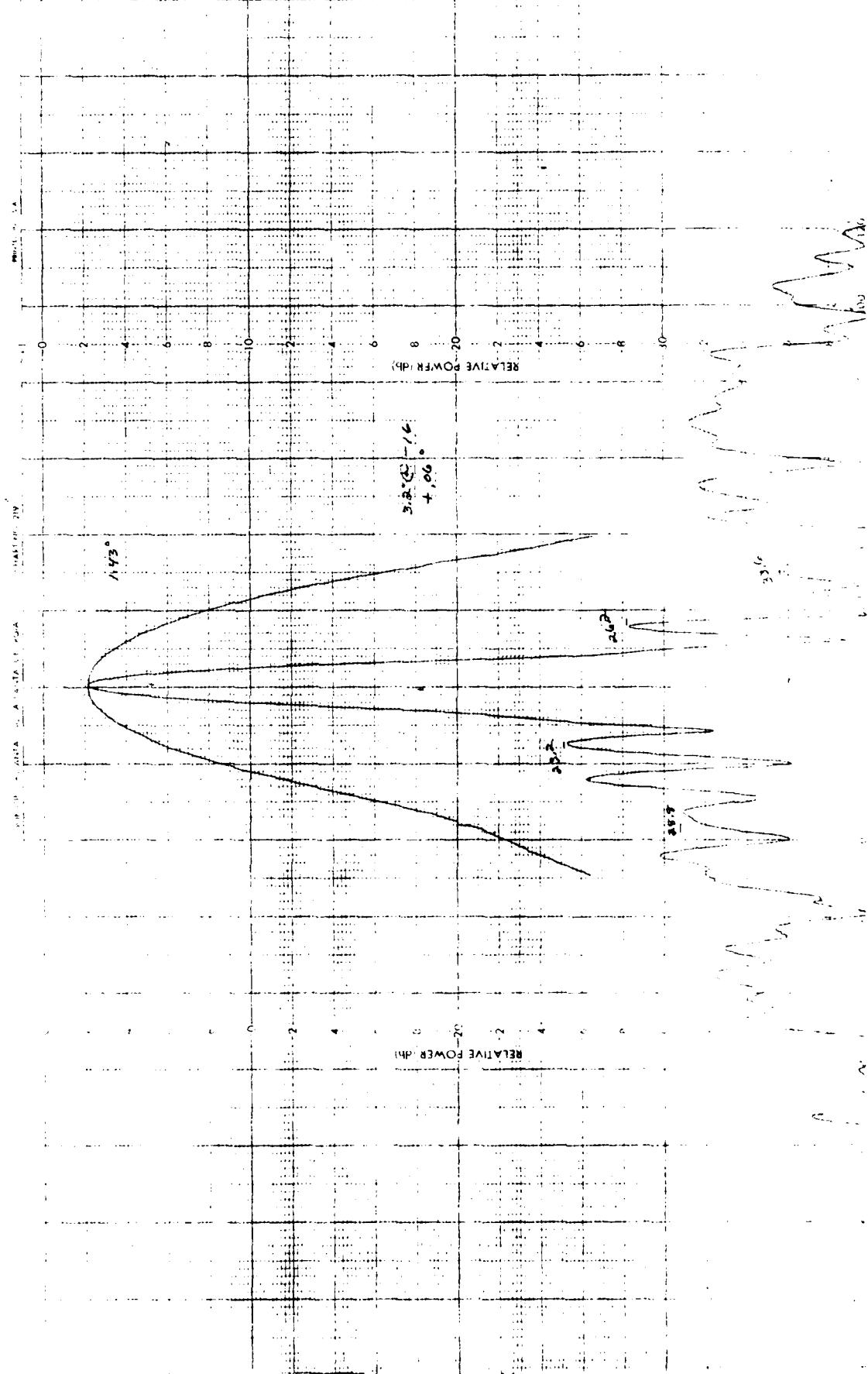
PROJ CI 1956-06  
-3 - REMARKS LOCU ENCLD RADOME ON

O. A2 - 30.0°C



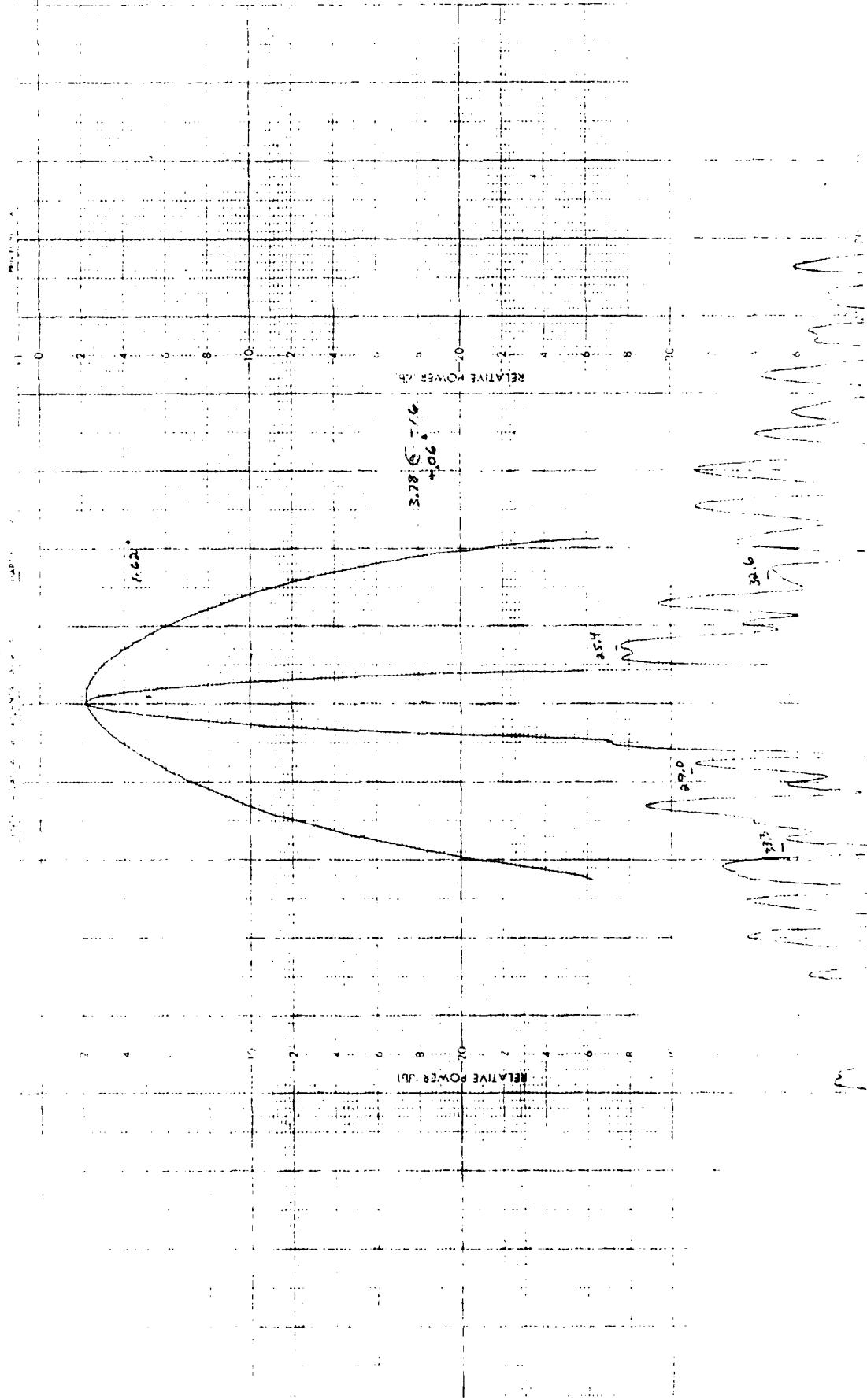
293672

ENGR APPS RF 72 DATE 27 AUG 51

AC. HZ -30.6C  
WAVES TO WENDY RADIOMETER ON  
WAVELENGTH 296-CC

6 - 1.500 .002 RADIAL RHODONITE ON  
ENR MRS RF TC DATE 27 AUG 81

293673



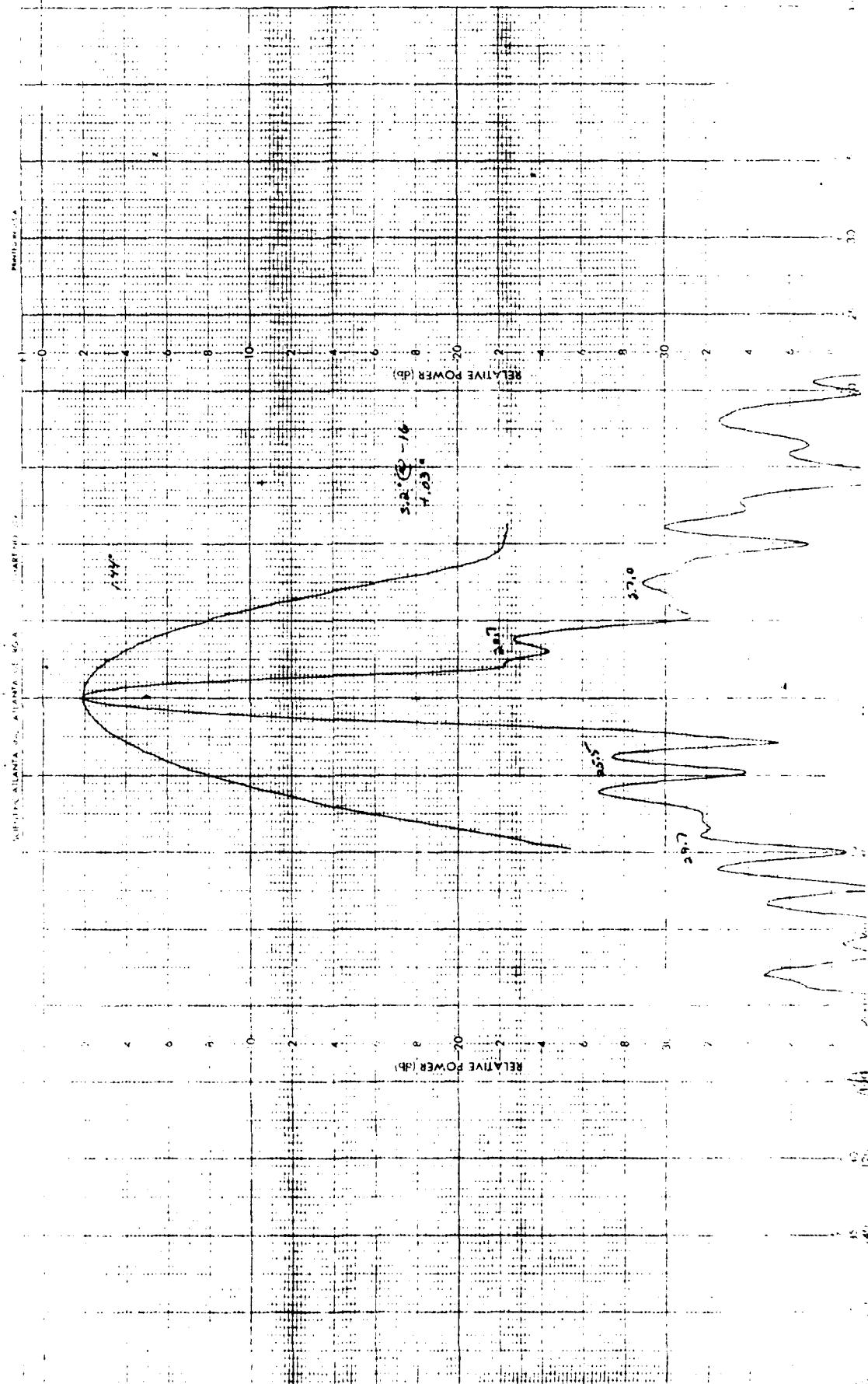
293674

ENGR MTS MFE TC

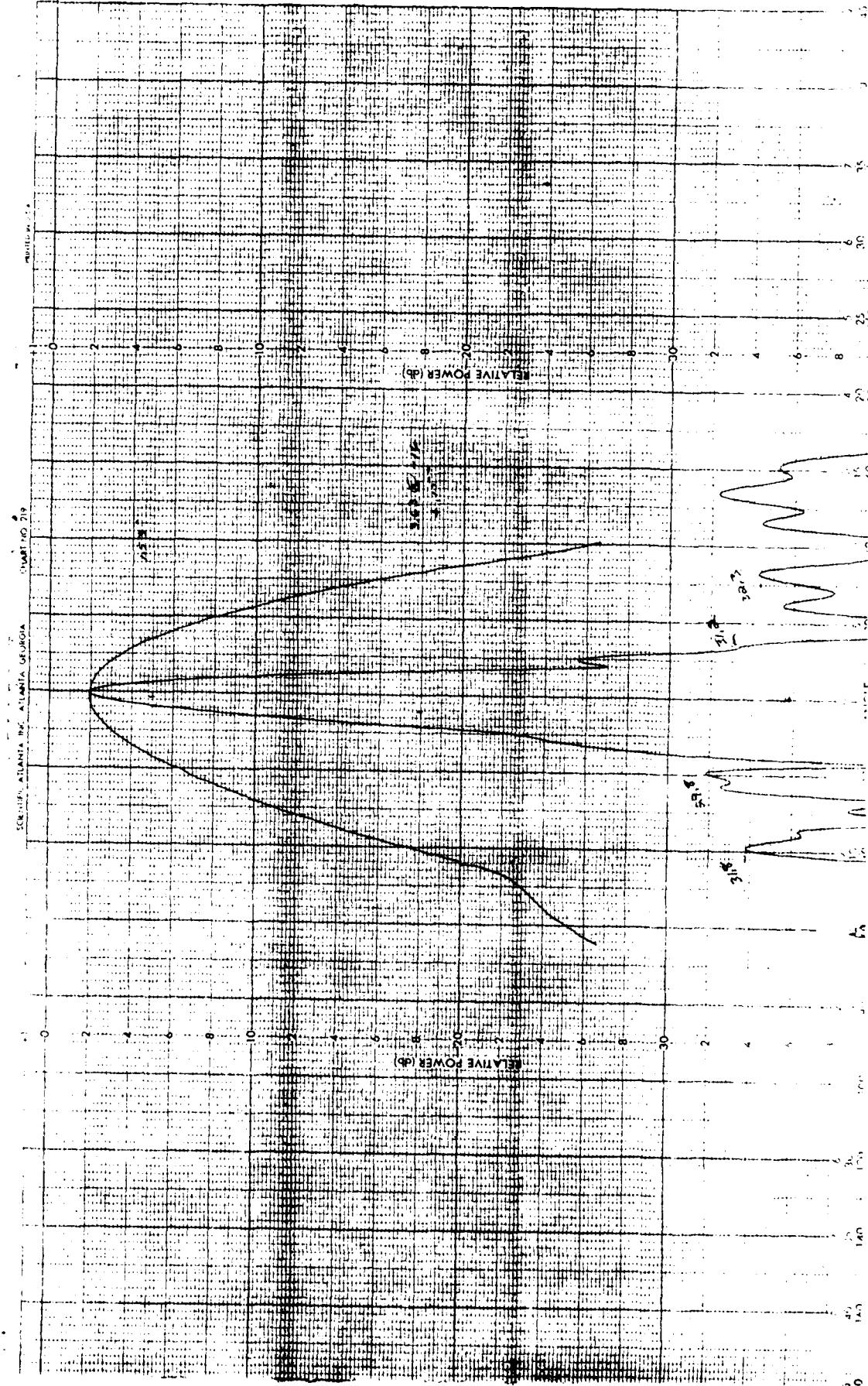
DATE 24 AUG 81

270° AZ -30° EL  
REMARKS LOW BAND HARMONICS ON

14-11-1 1996-C2



PROJECT 1886-CG  
EKG 805 RE 7C DATE 21 JULY 87  
293667  
-01 - REMARKS LOW BAND RESPONSE ON

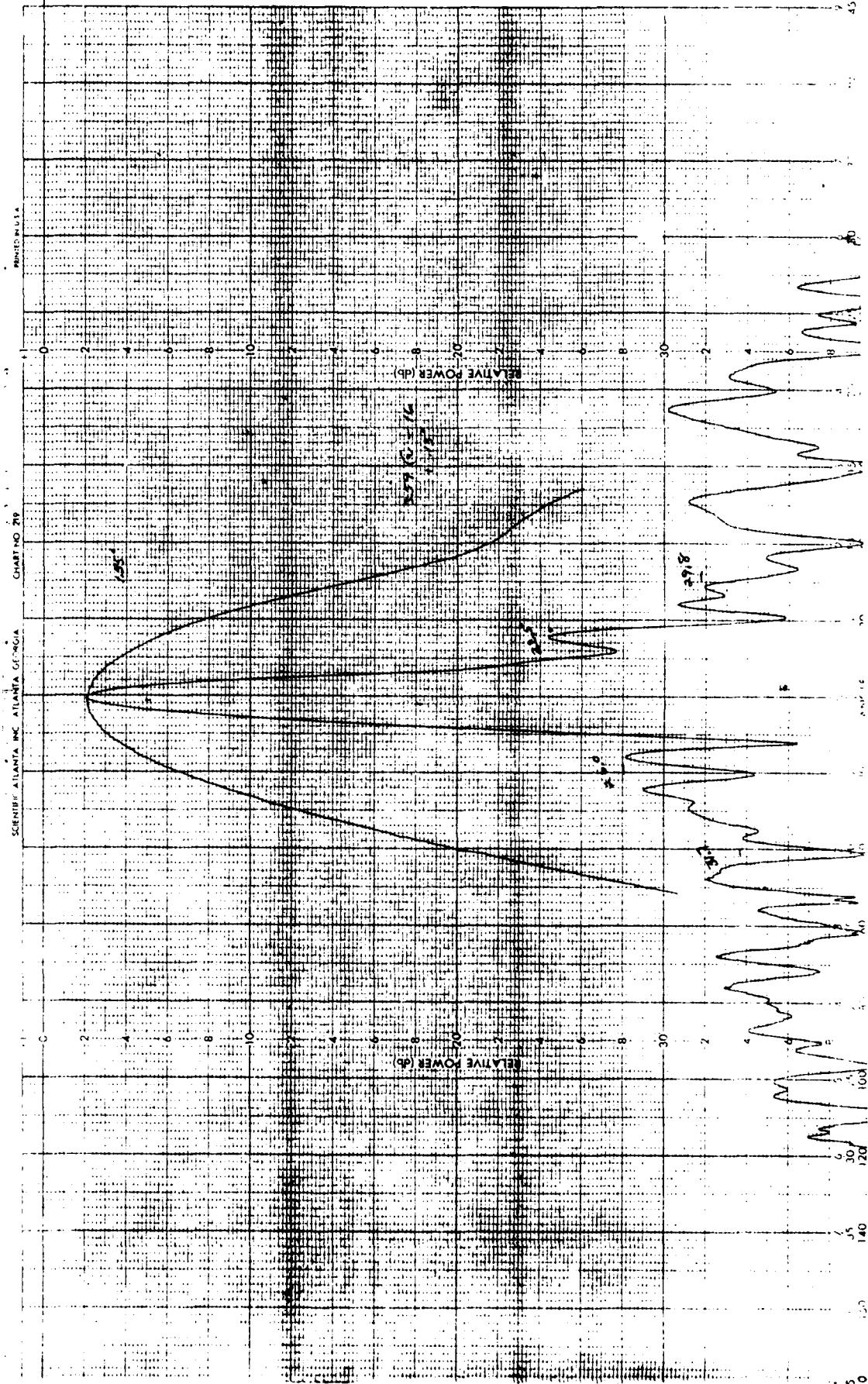


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75.08 + 24.06

16 -

-11 - REMARKS LOW FAND RADOME OR

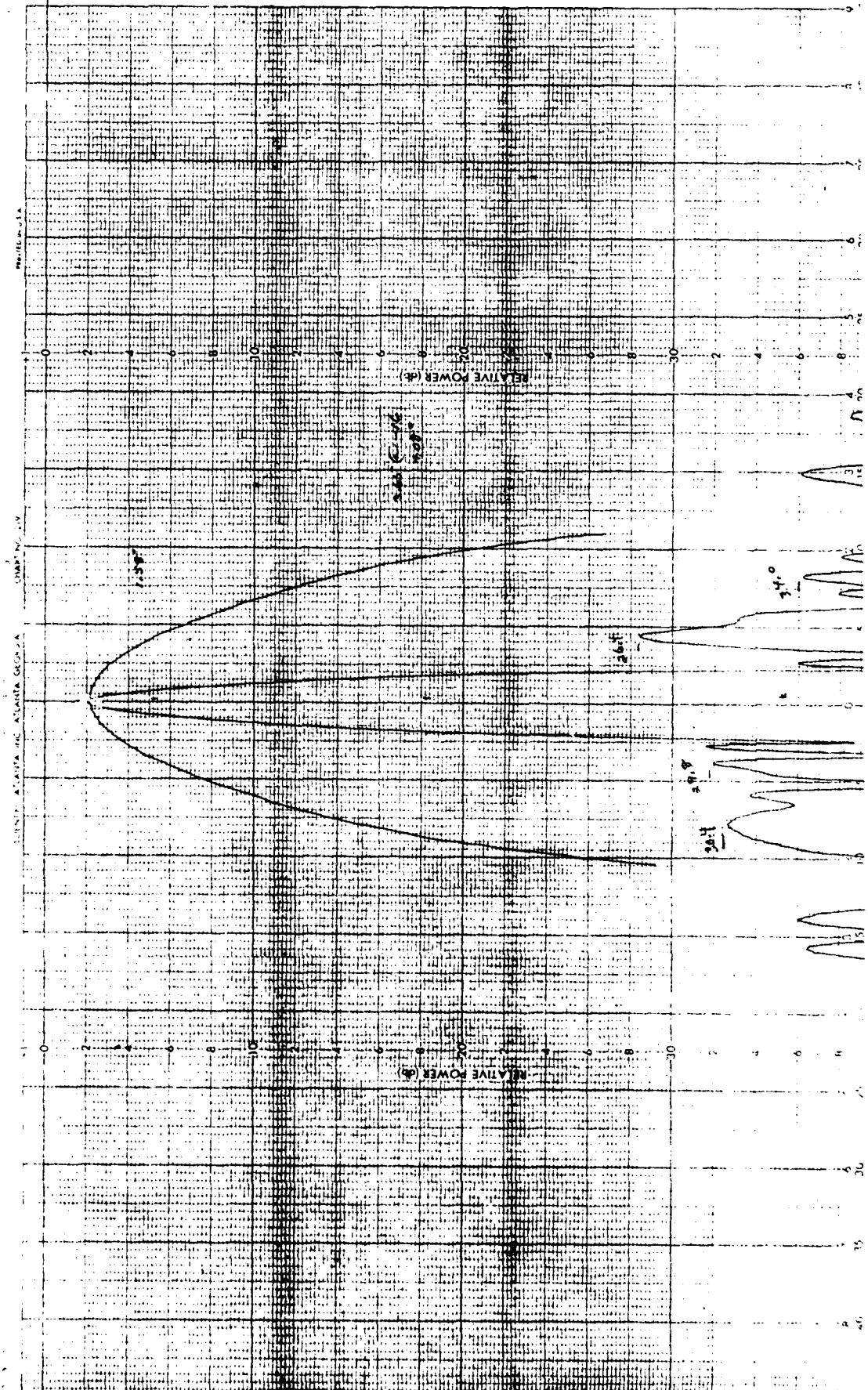


180° AZ + 30° EL  
21 - REMARKS LOW END RADOME ON

ENR

DATE 24 AUG 81

293669

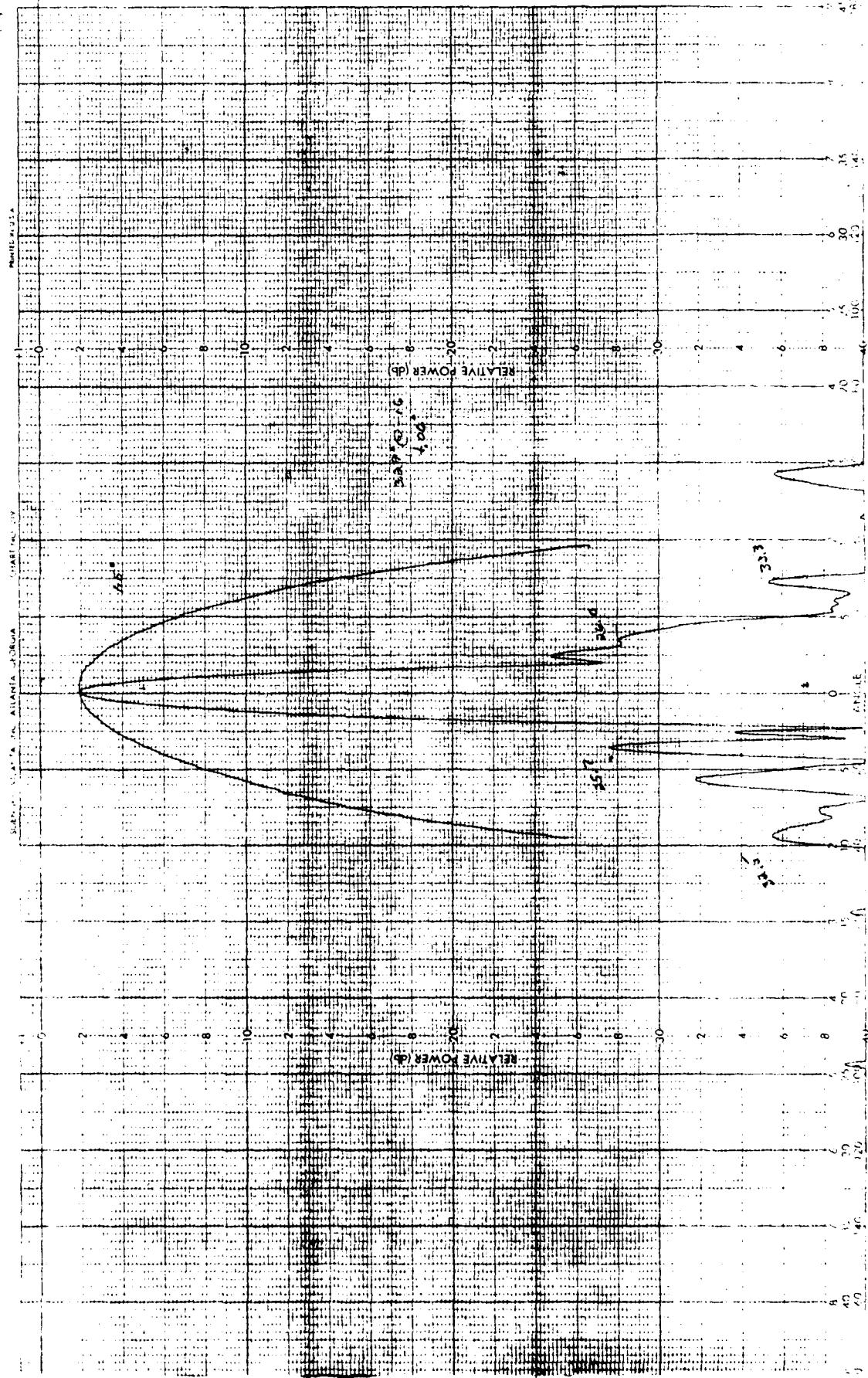


293670

1

PROJECT 1986-06  
ENGR APPS FOR TC DATE 21 NOV 81  
293670  
-8/- REMARKS LOW BAND RADIOME ON

2700 AZ 30.0 E



293675

PROJECT 1986-C6  
-H1 - REMARKS LOG AND RANDOM ON  
360° RUN AT 0° EL ANGLE

ENGR NO 293675 DATE 24 MAY 81

SOUTHERN ATLANTIC INC., ATLANTA, GEORGIA  
CHART NO. 2910

PRINTED ON 1A

CHART NO.

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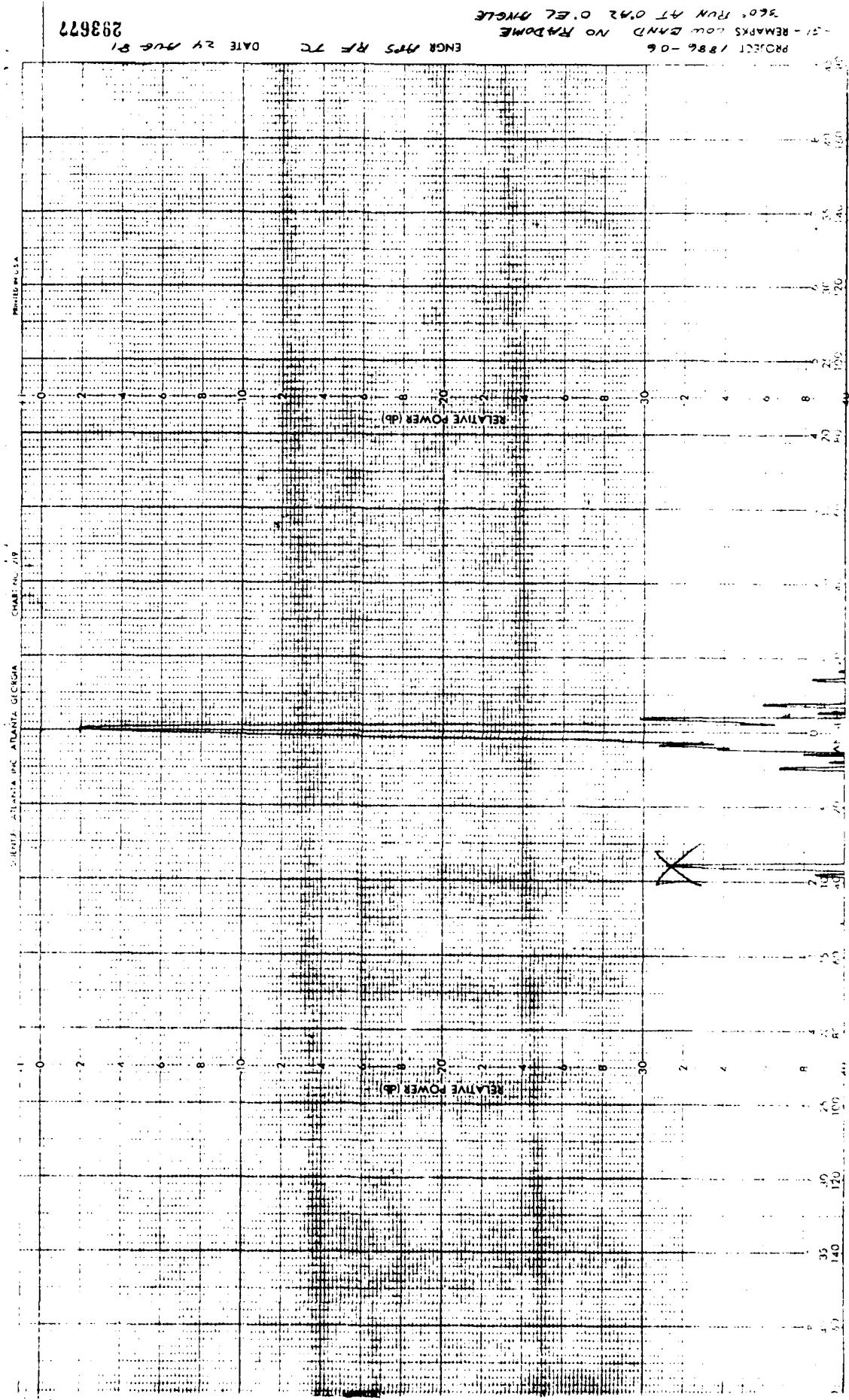
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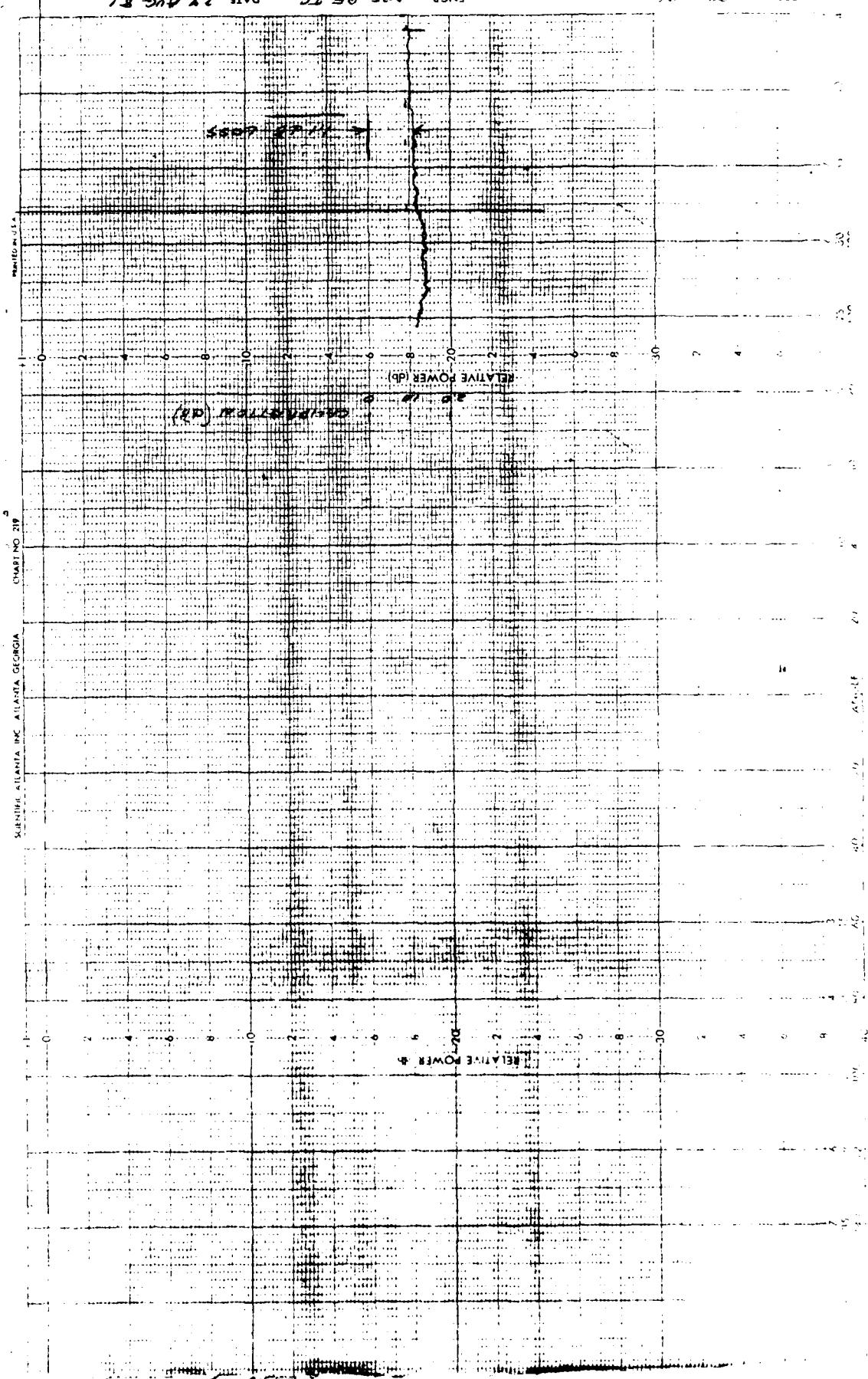
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-91 - REMARKS LOW LAND TX 6055

293676

ENGR APPS NF 7C DATE 24 AUG 81

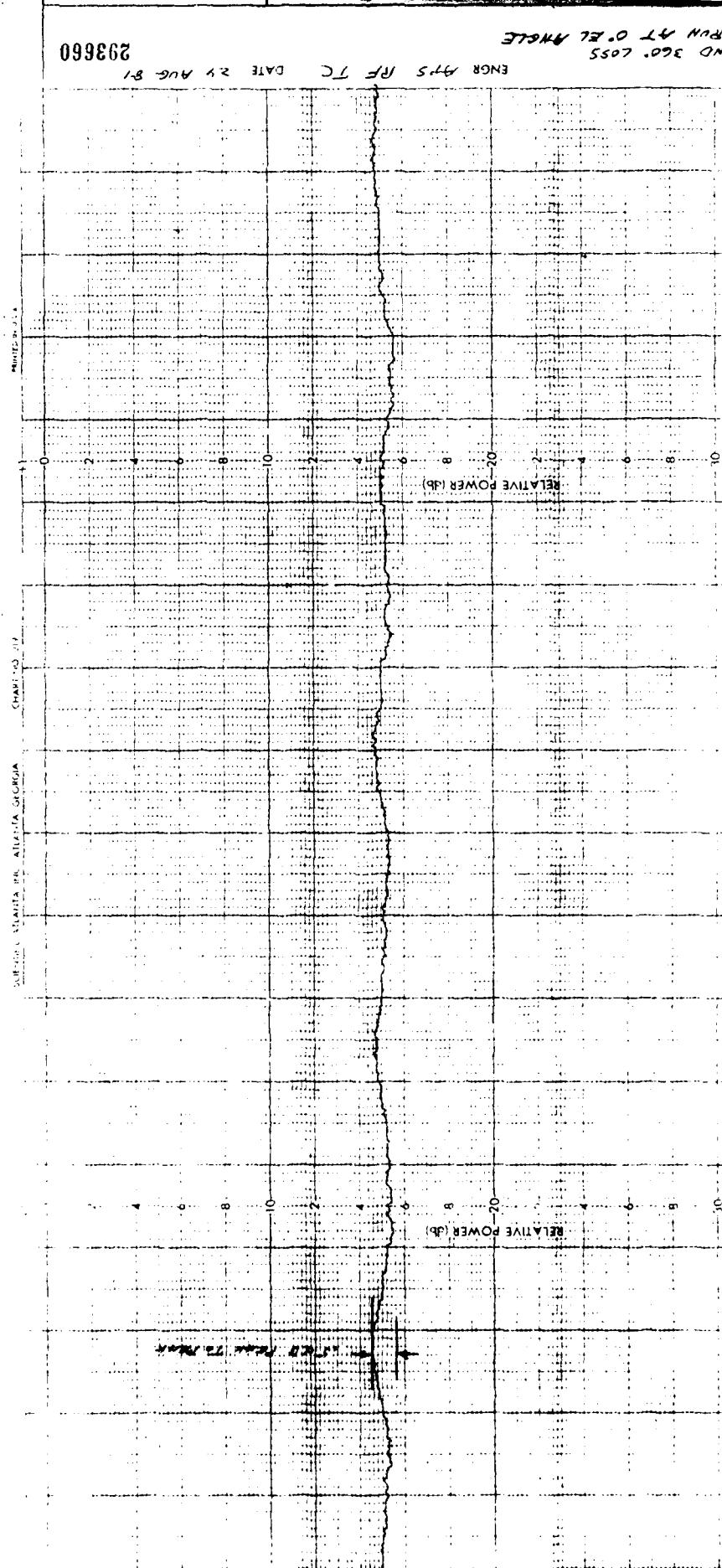


VARIMAGNETICITY PNU 47 Q.E.L. ANGLE  
-L - REMARKS 2 QW END 360. LOSS

PROJECT 996-AC

293660

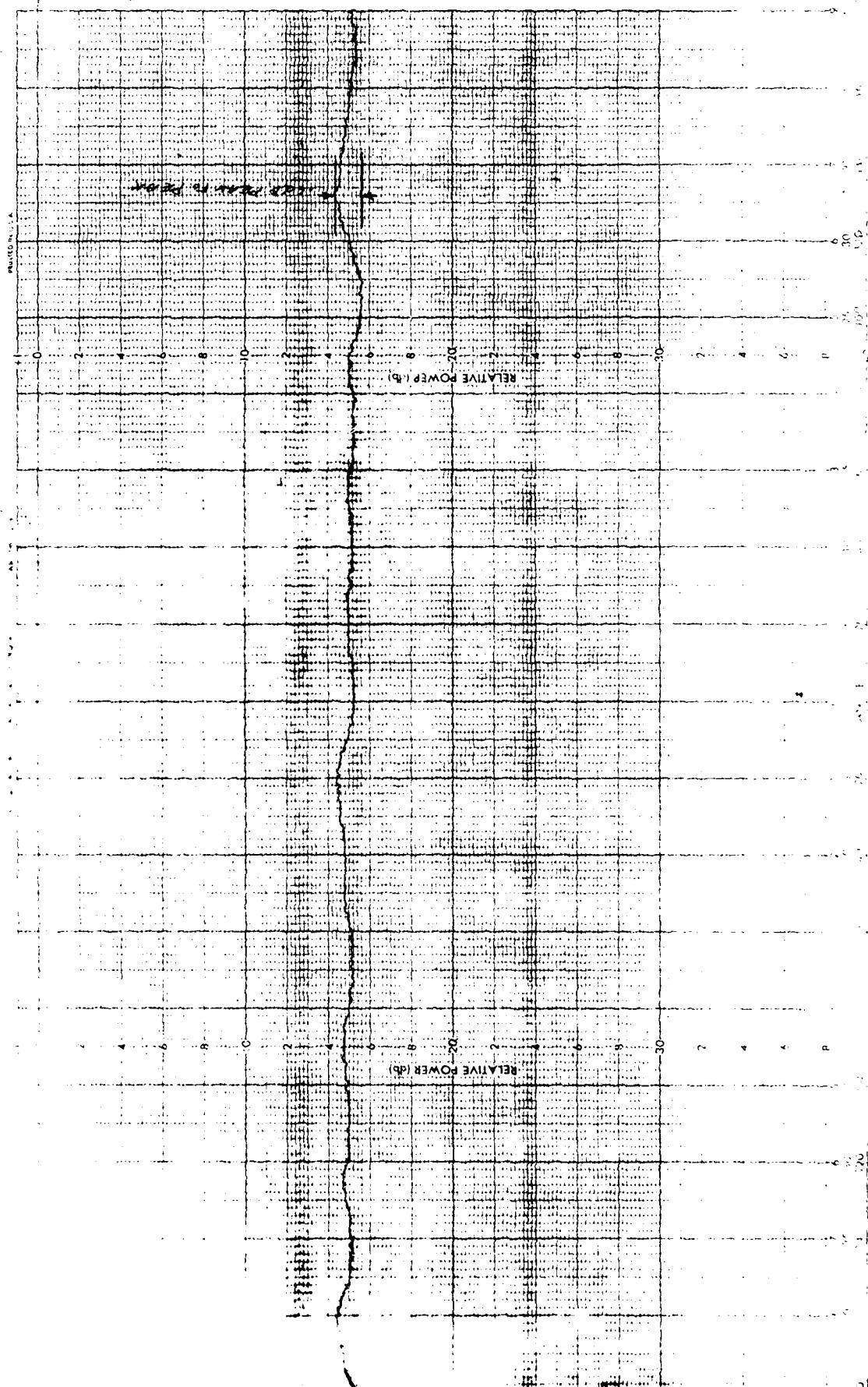
ENGR AT&T RF TC DATE 21 AUG 81



293662

-31- REMARKS LOW END 360° LOSSES

PROJECT 996-CC DATE 29 AUG 81



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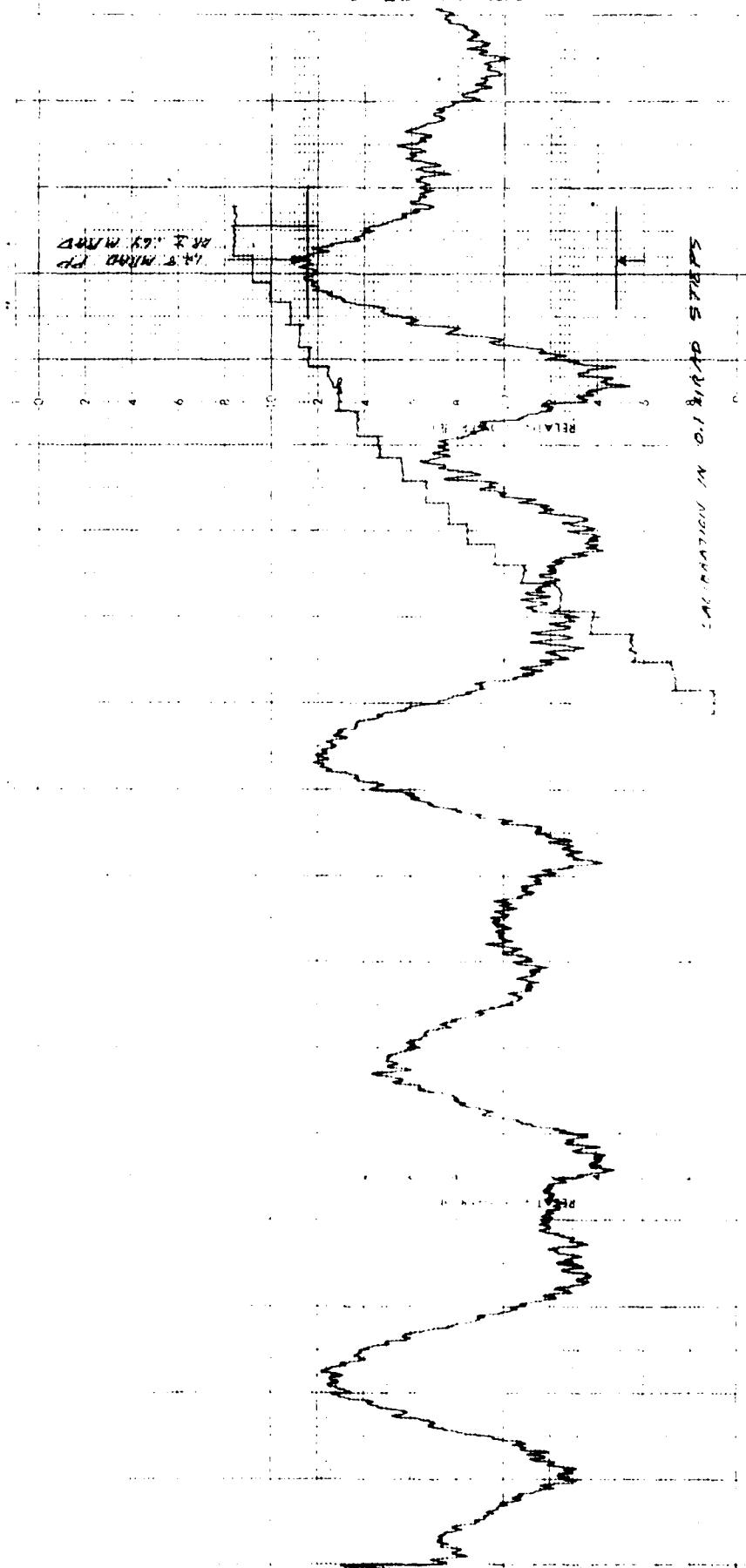
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-305

20 AUG 81 1447Z 25C BONE SIGHT  
20 AUG 81 1447Z 25C BONE SIGHT

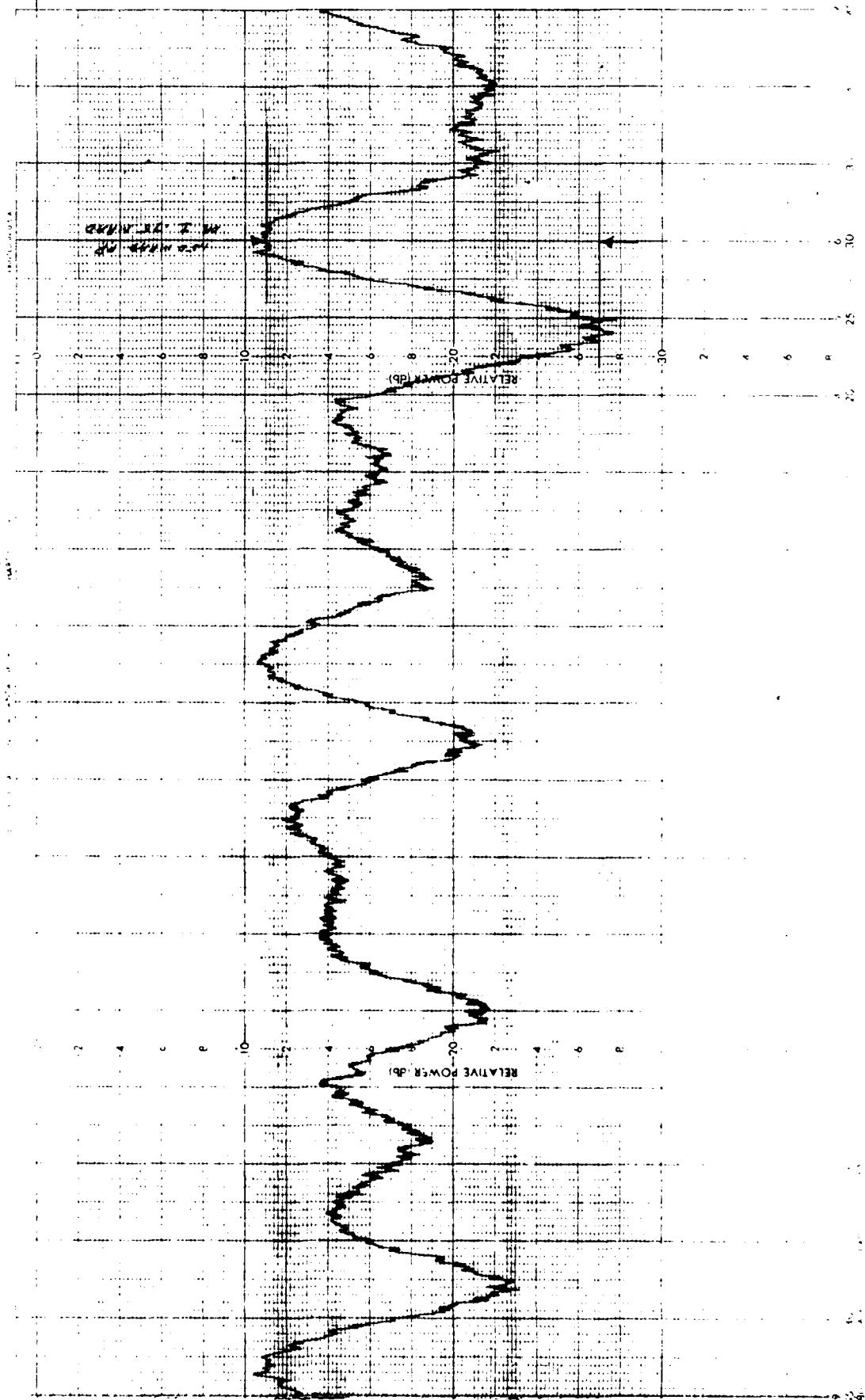
203653

ENCR 14105 RFE 7C DATE 20 AUG 81



298657

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PROJECT 1886-CC  
ENGR ATTS RFE 72 DATE 21 AUG 81  
-2 - REMARKS LCU 39 AND 360° ECHOSIGNS  
RIN A7 - 50.0° ELE ANGLE

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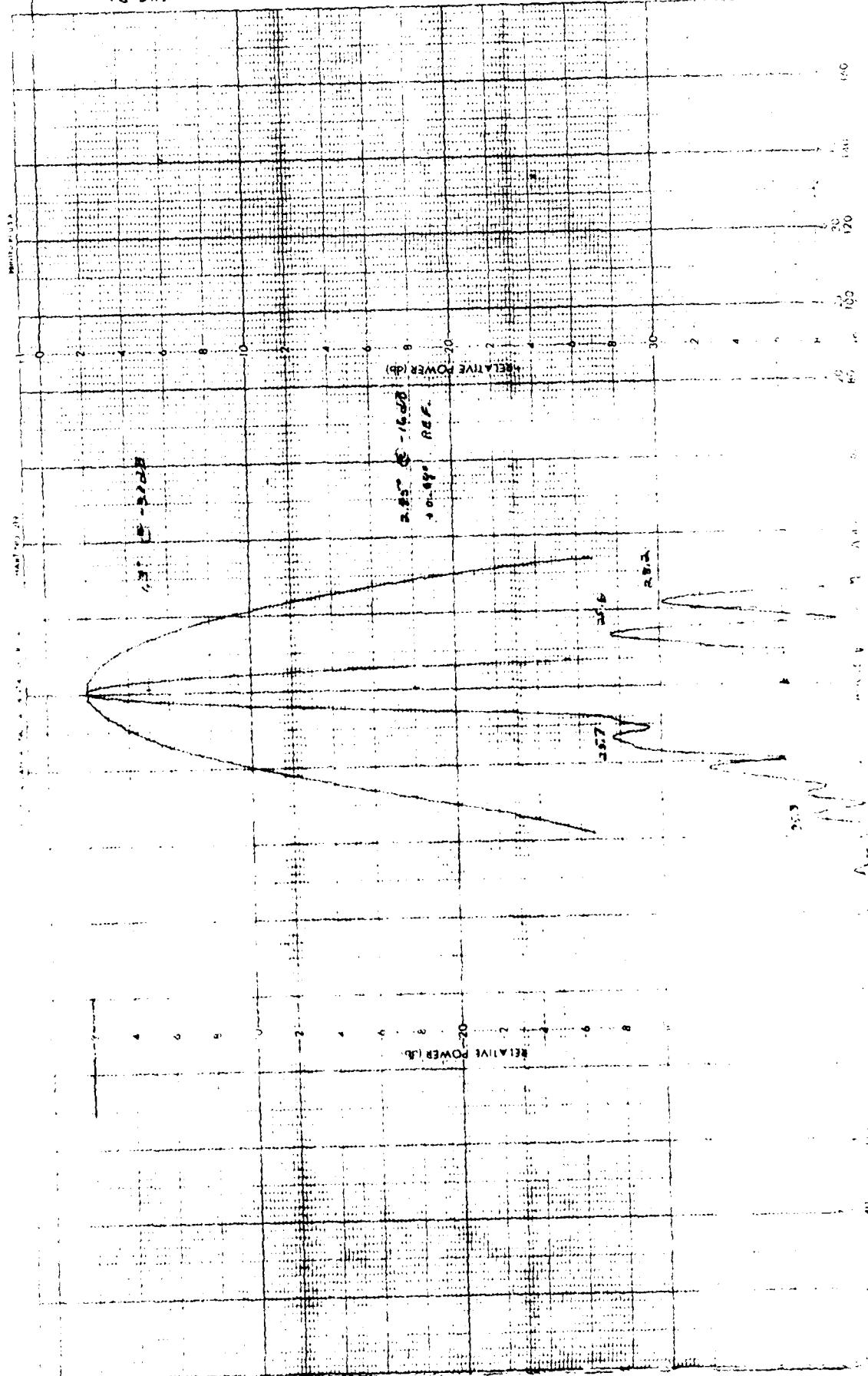
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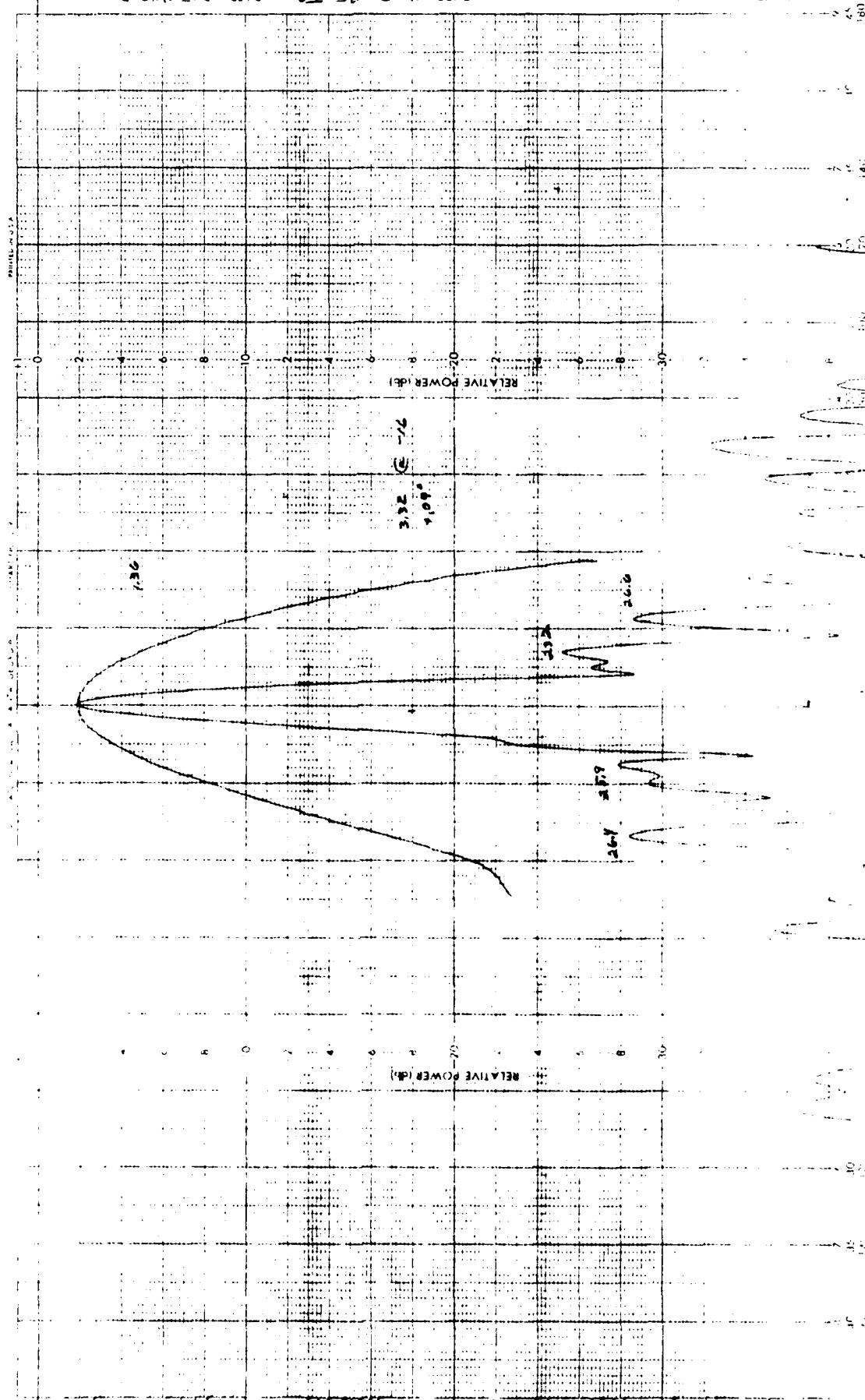
253627

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-23-REMARKS 1111D GHWB - NO THROAT  
PROJECT 1886-06



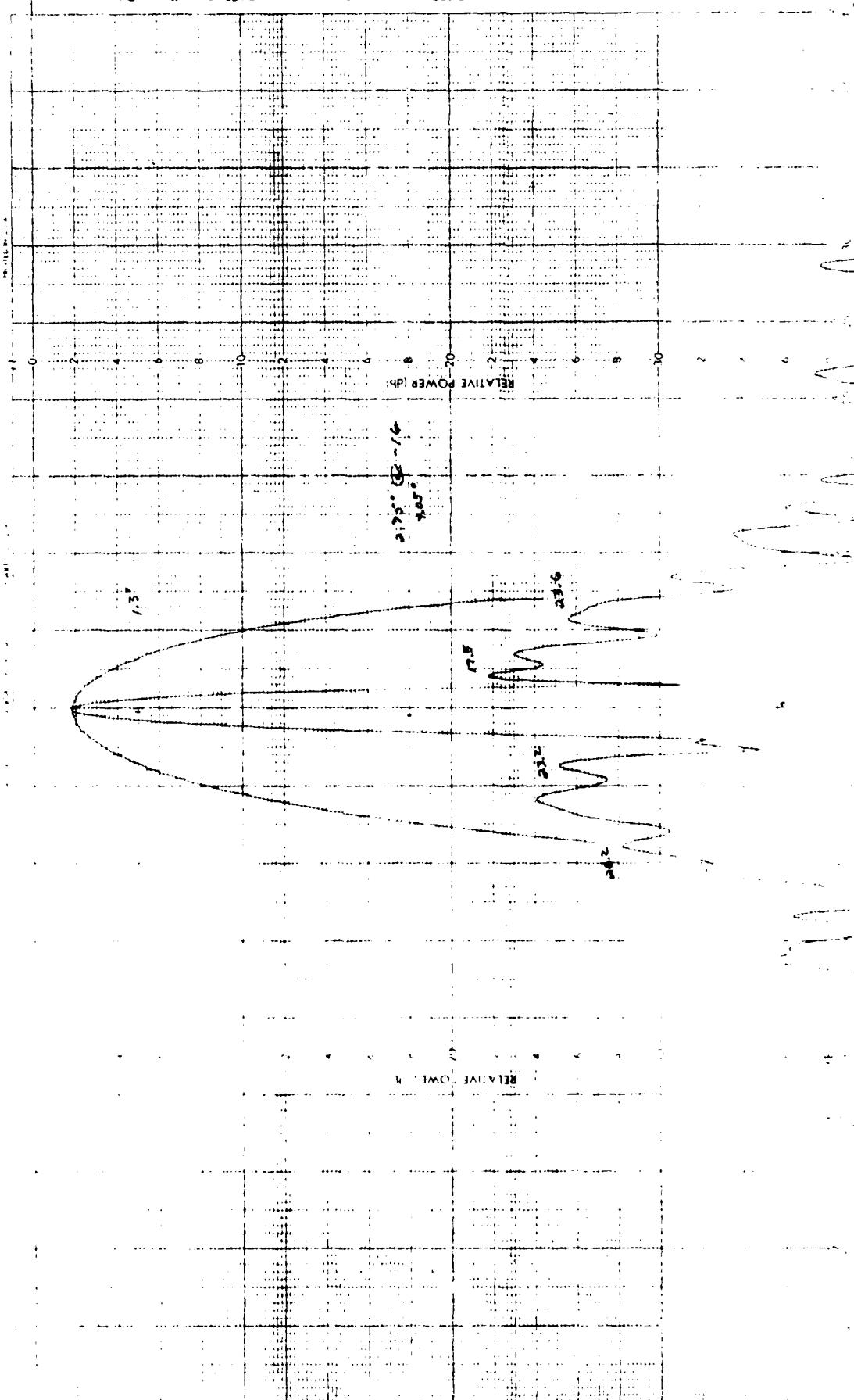
299435

ENR 14715 RF TC DATE 25 AUG 81  
PROJECT 1986-CG REMARKS 1110 END RNDCE ON 9 AM 5 PM

293636

-58- REMARKS W10 L100G PHOTONIC ON  
PROJECT 7986-C6

ENGR MPS RF TC DATE 25 AUG 81

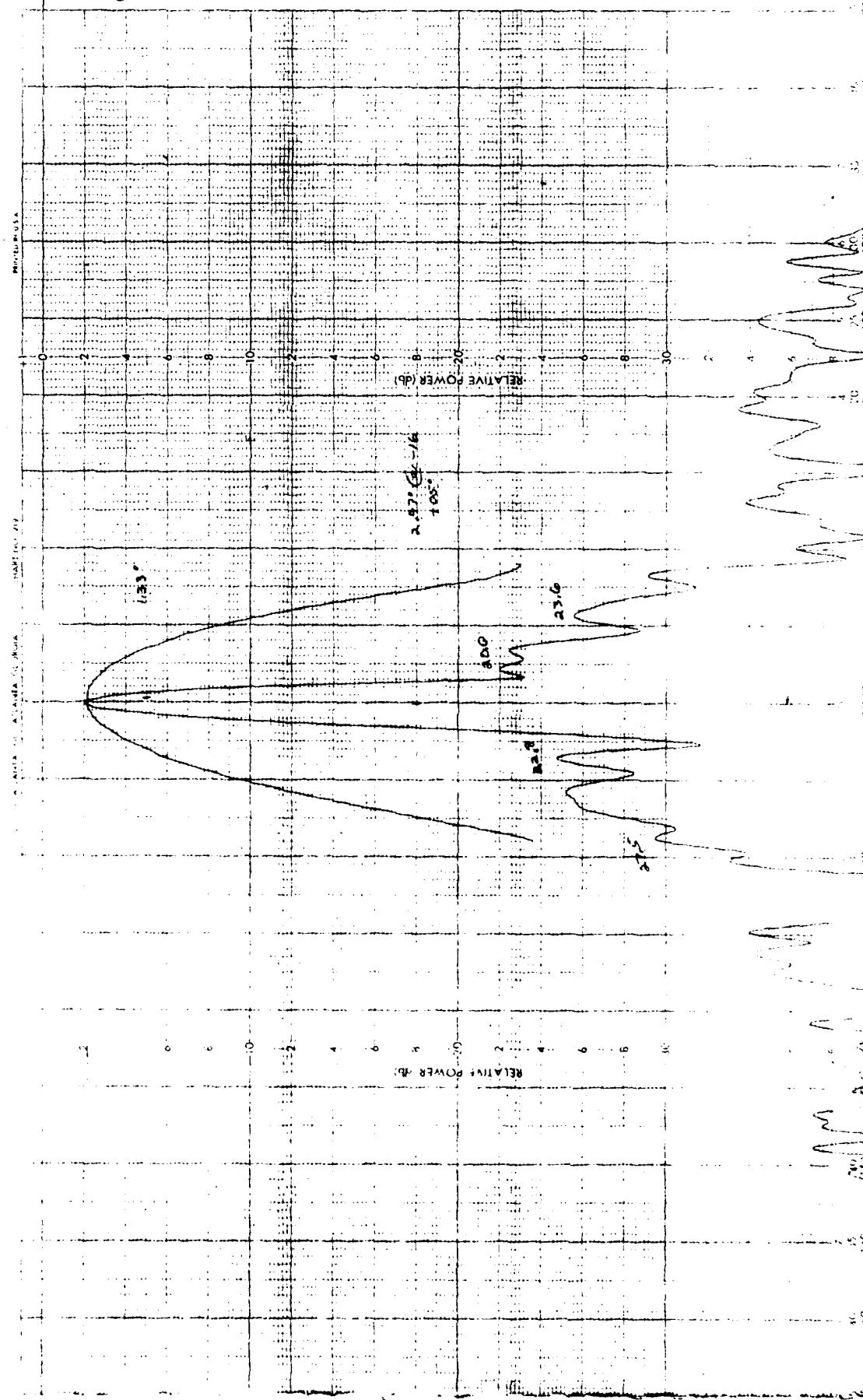




293638

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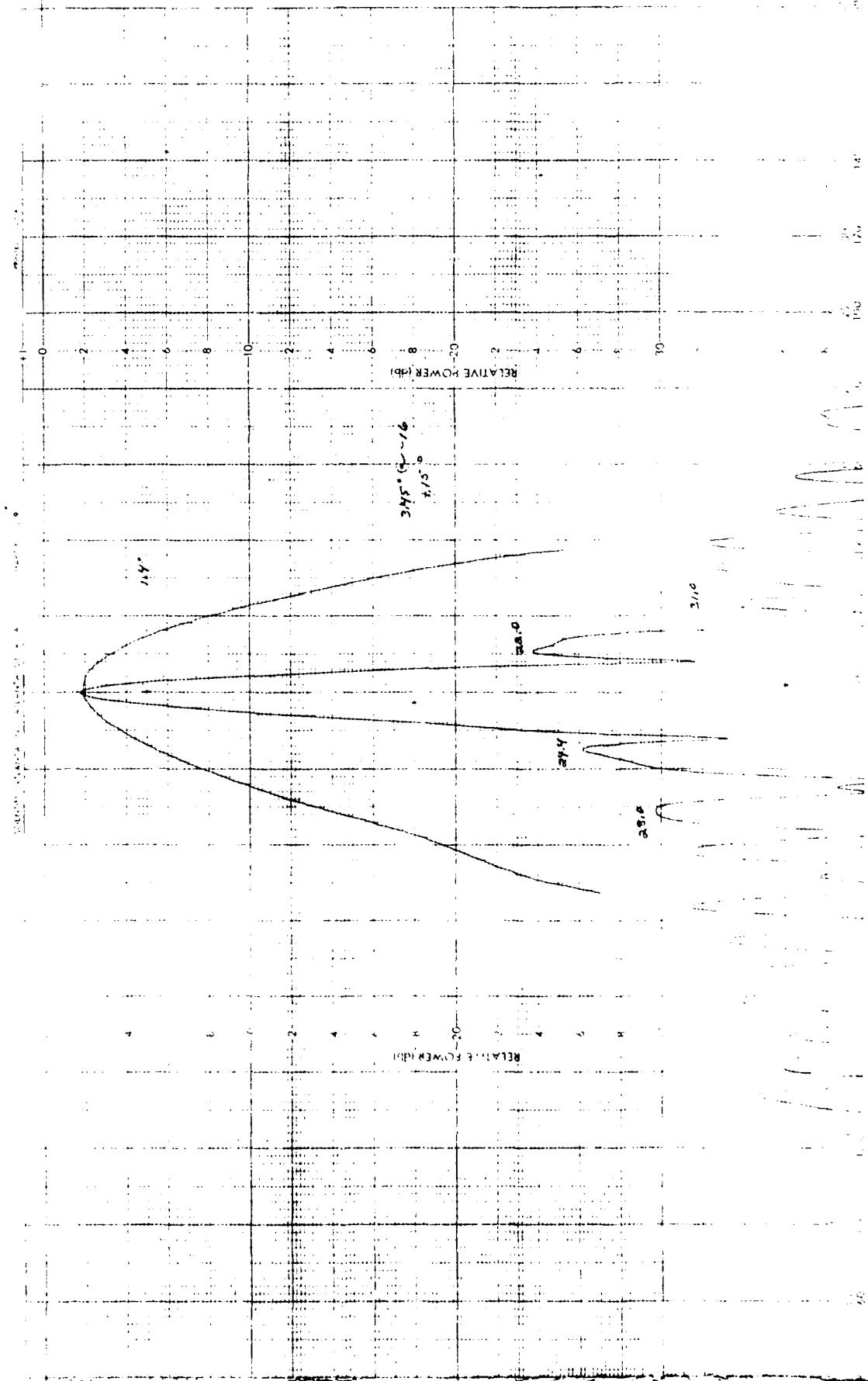
ENGR MTS RS TC DATE 25 AUG 81

-72-32MARS N110 L34ND R2DNE ON  
PROJ ID 1956-06  
27C, 42 0.6L

-32 -REMARKS HIGH SWING RADIOMODE ON  
PROJECT 1886-06  
C. MZ -30.0 E.L.

293693

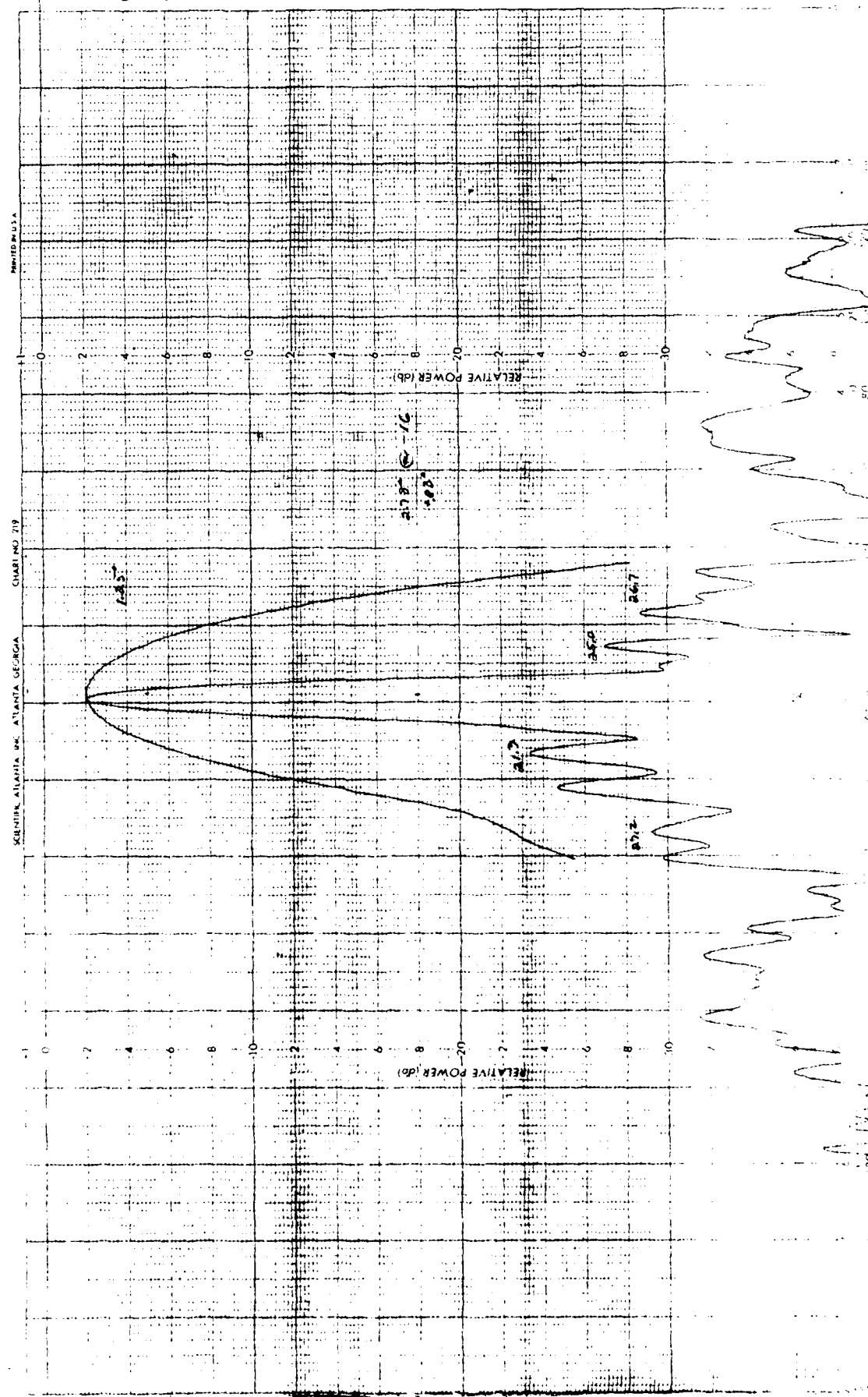
ENGR ATTS RF TC DATE 25 JUNE 81



293643

-62- REMARKS NICE BAND RESPONSE ON  
PROJECT 1986-06

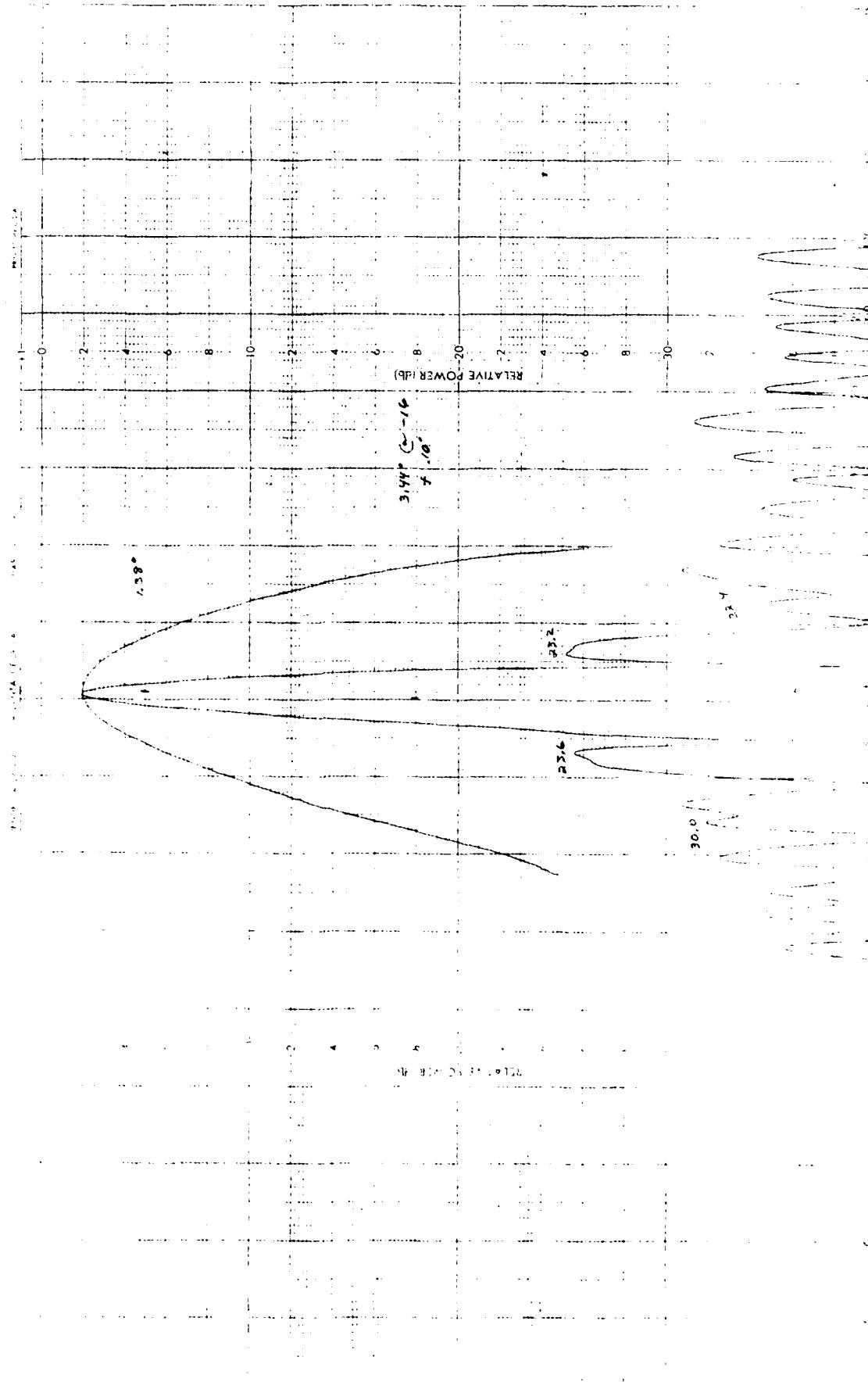
ENGR 9705 RF TC DATE 25 AUG 81



1960 AUG -30°EL  
-30°BEAMHOLES AND ELEVATION RADIOPHONIC ON  
RECEIVER 1960-06

293645

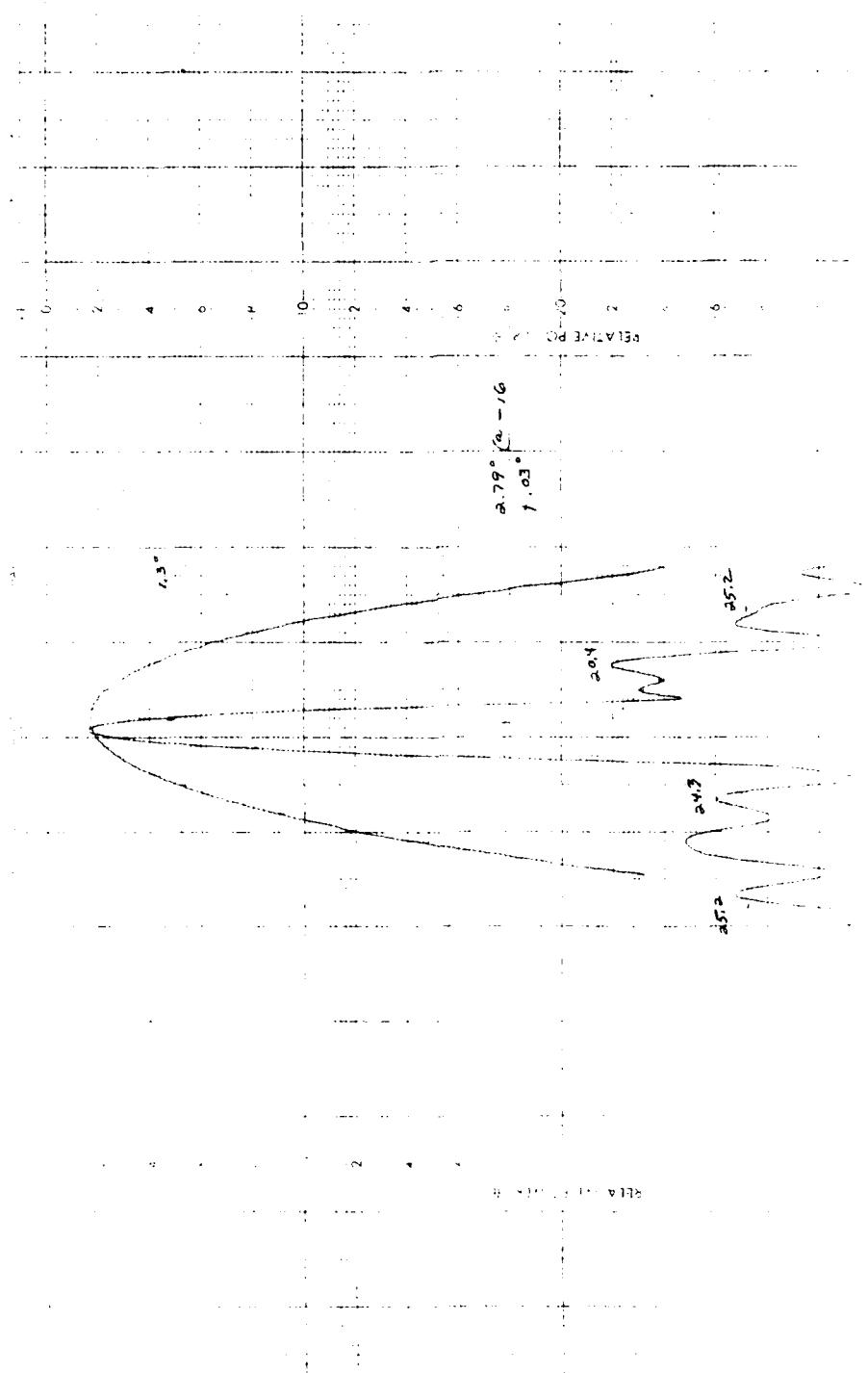
ENG RTTS RF TC DATE 25 AUG 61



72-08-24 1002  
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9798 12

一八〇



AD-A107 404 ELECTRONIC SPACE SYSTEMS CORP CONCORD MA\*  
FINAL ELECTROMAGNETIC TEST REPORT FOR THE M10-76-8000 MADOME WI--ETC(U)  
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TH-81-8

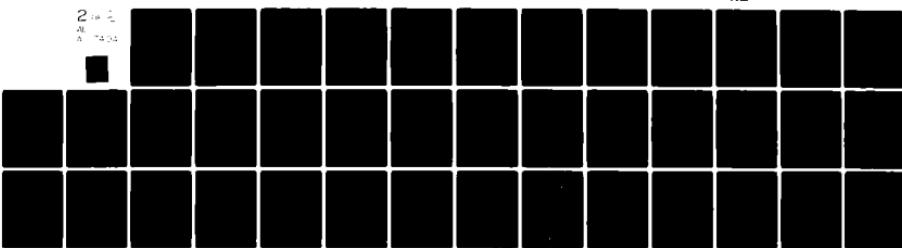
F/6 17/9

NU0173-80-C-0345

NL

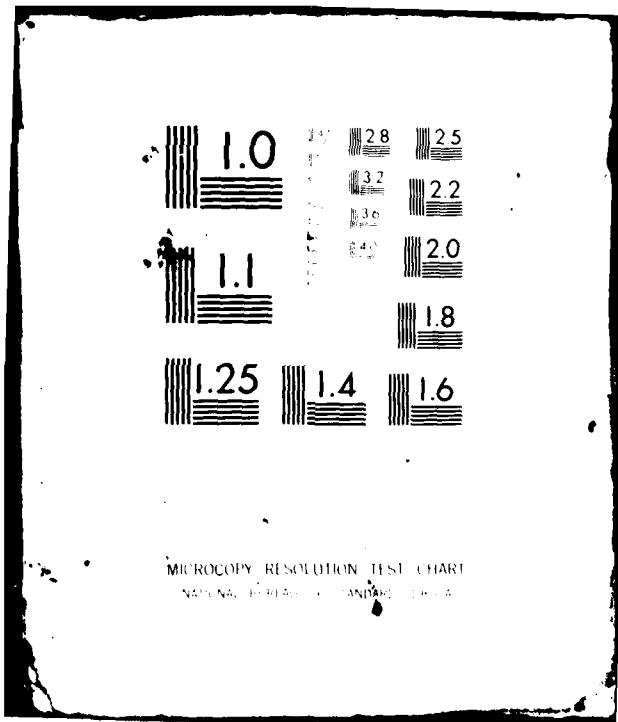
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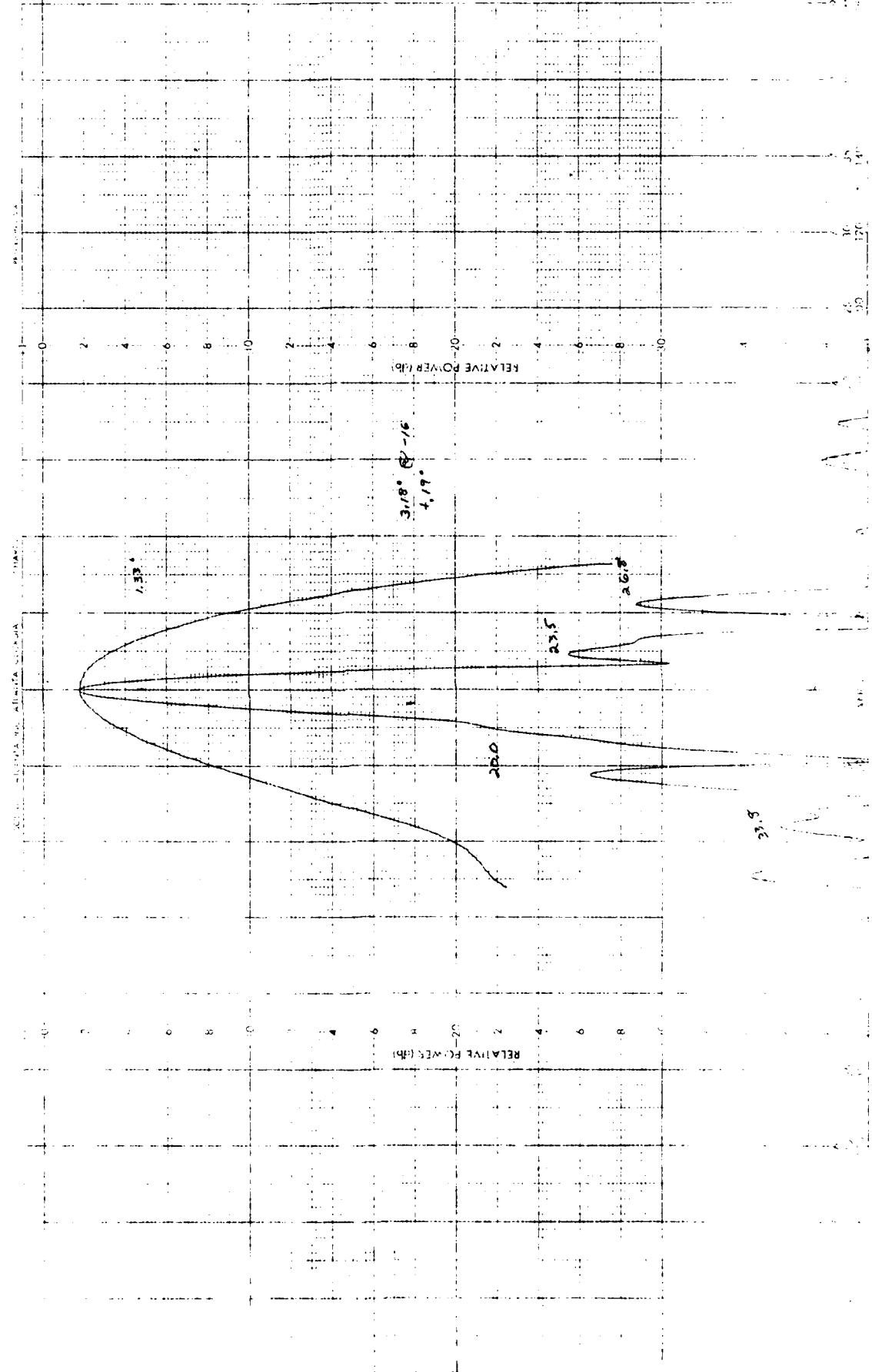
293639

1856-06

PROJECT 1856-06  
-2E - REMARKS MID BAND RELATIVE ON  
ENCR 47025 TFF TC DATE 25 NOV 51

C. AZ

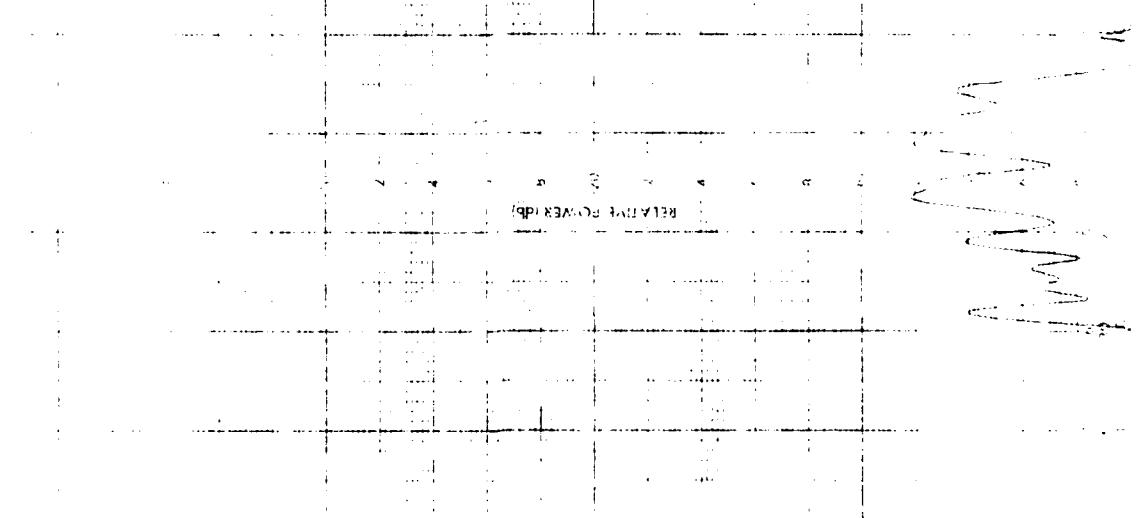
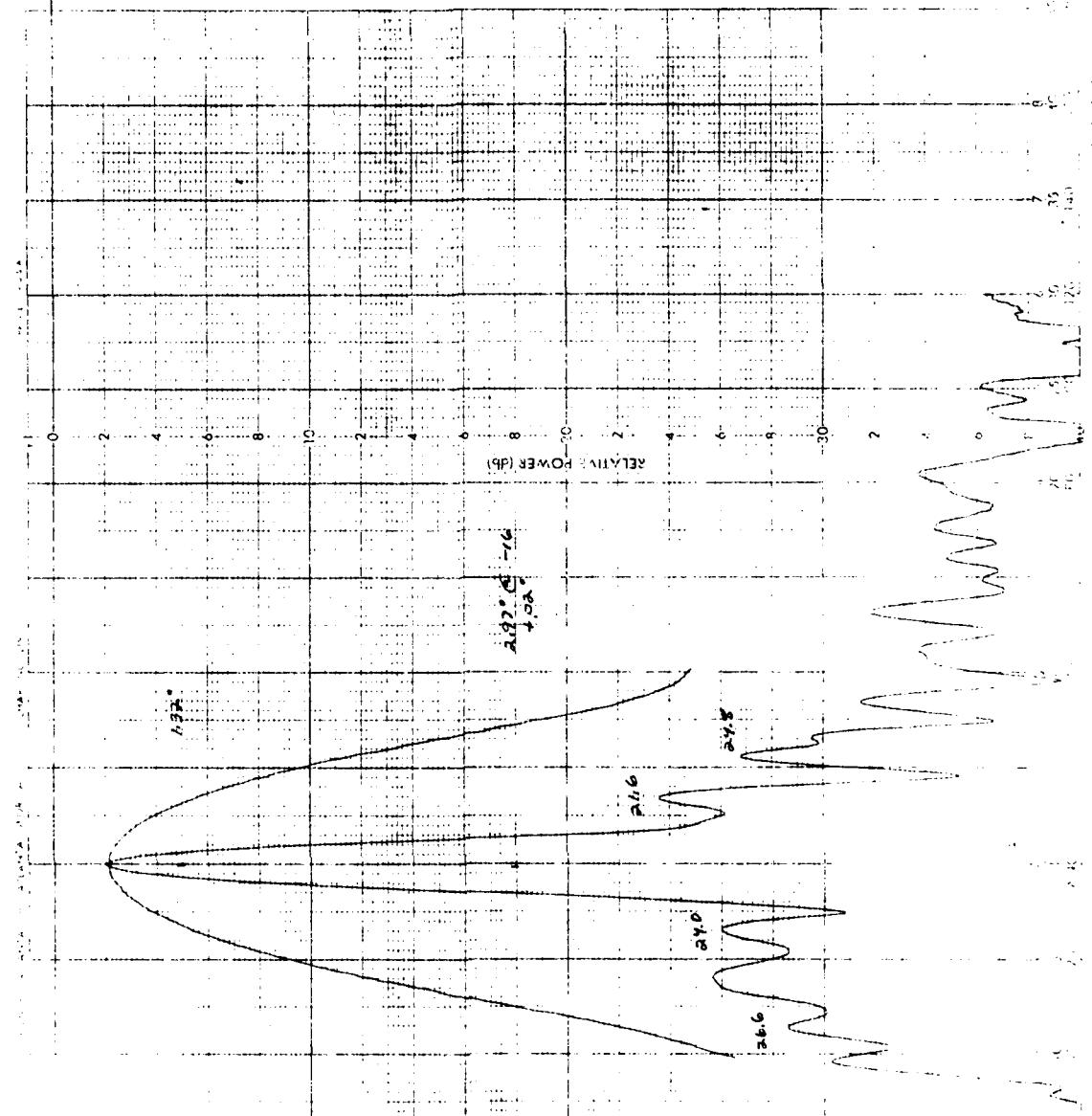
730°EL



293630

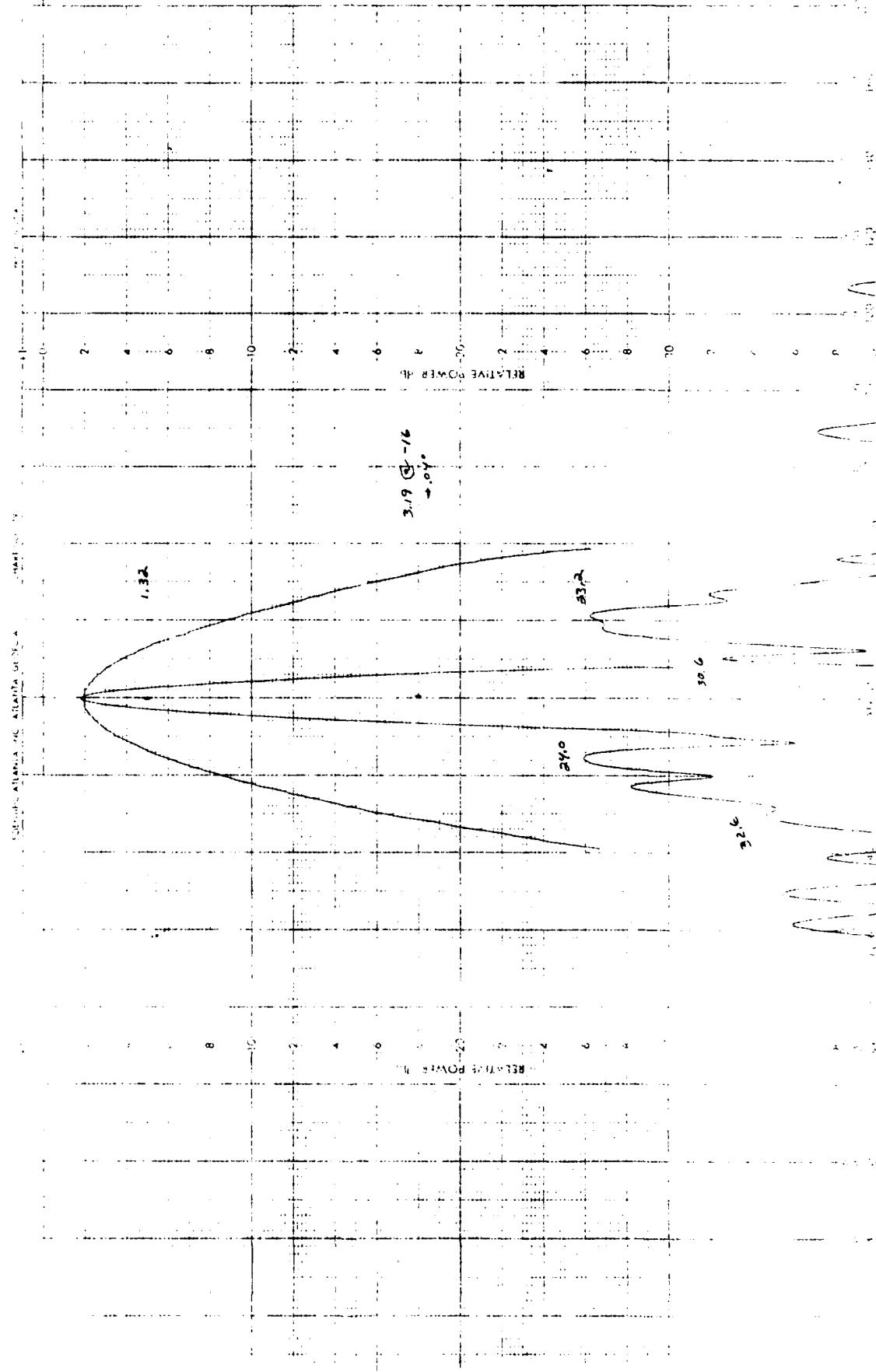
ENGR MTS AF TC DATE 25 NOV 81

24.06 725.EL 33-34343 N111 E111 MADE ON



-43 - 2000 AIRS AND PLANE READING ON  
NOVEMBER 1946 - C6 DATE 25 NOV 46

293631



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25

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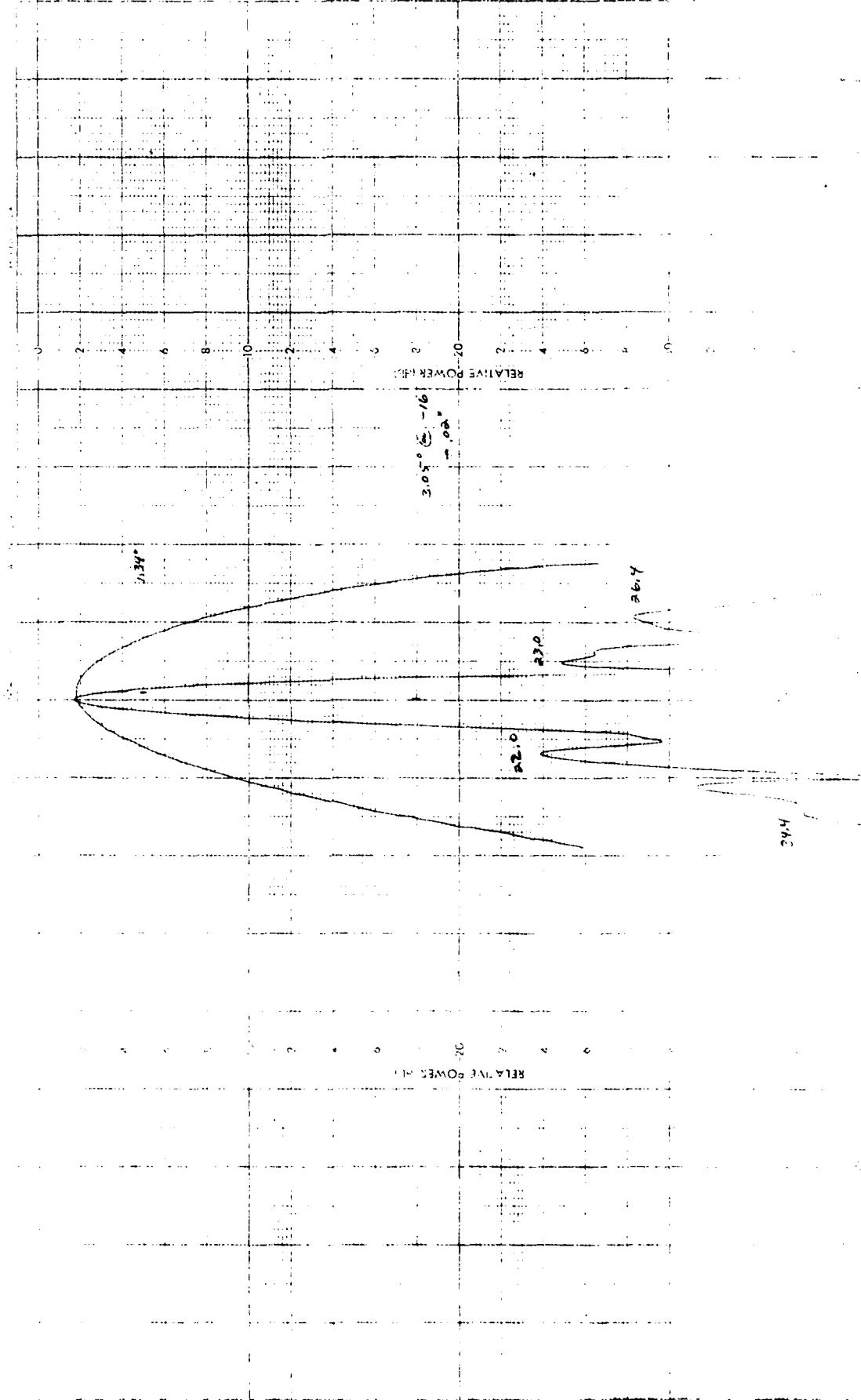
ENGR M715 RF TC DATE 25 MAY 81

2300 WZ +20° EEL

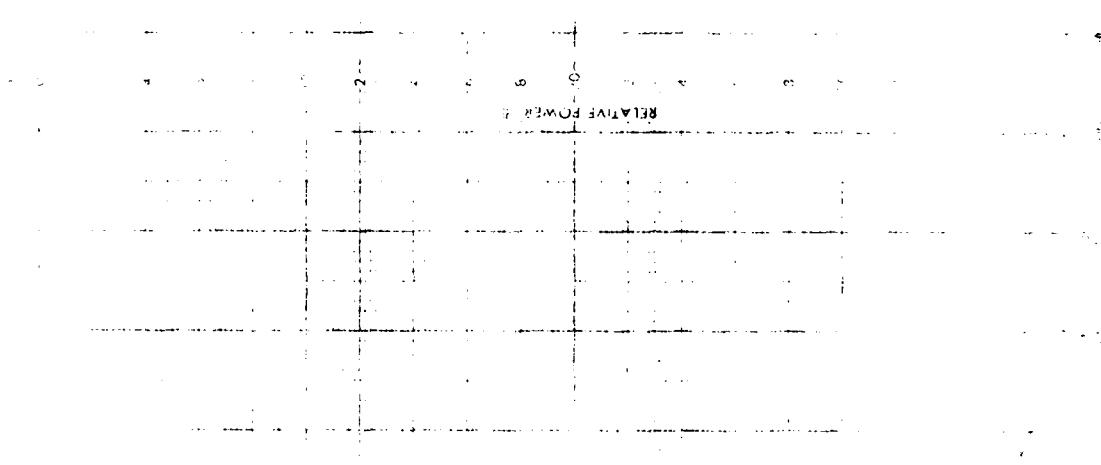
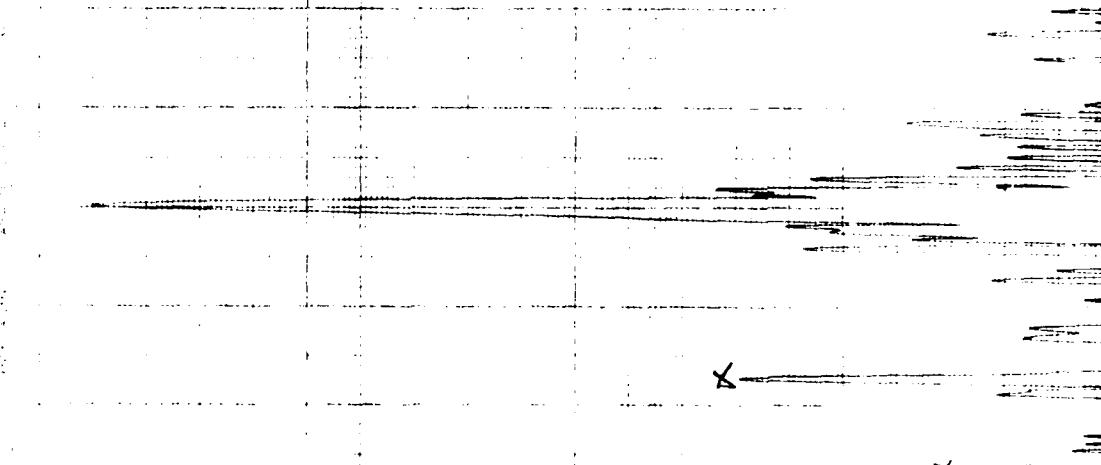
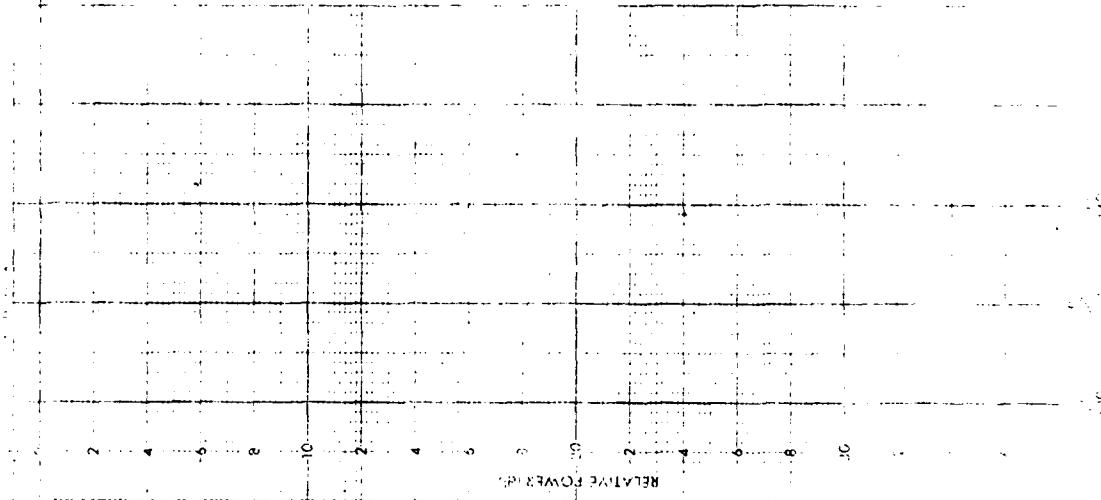
50-3642-25-26

1110 LNU RADOME ON

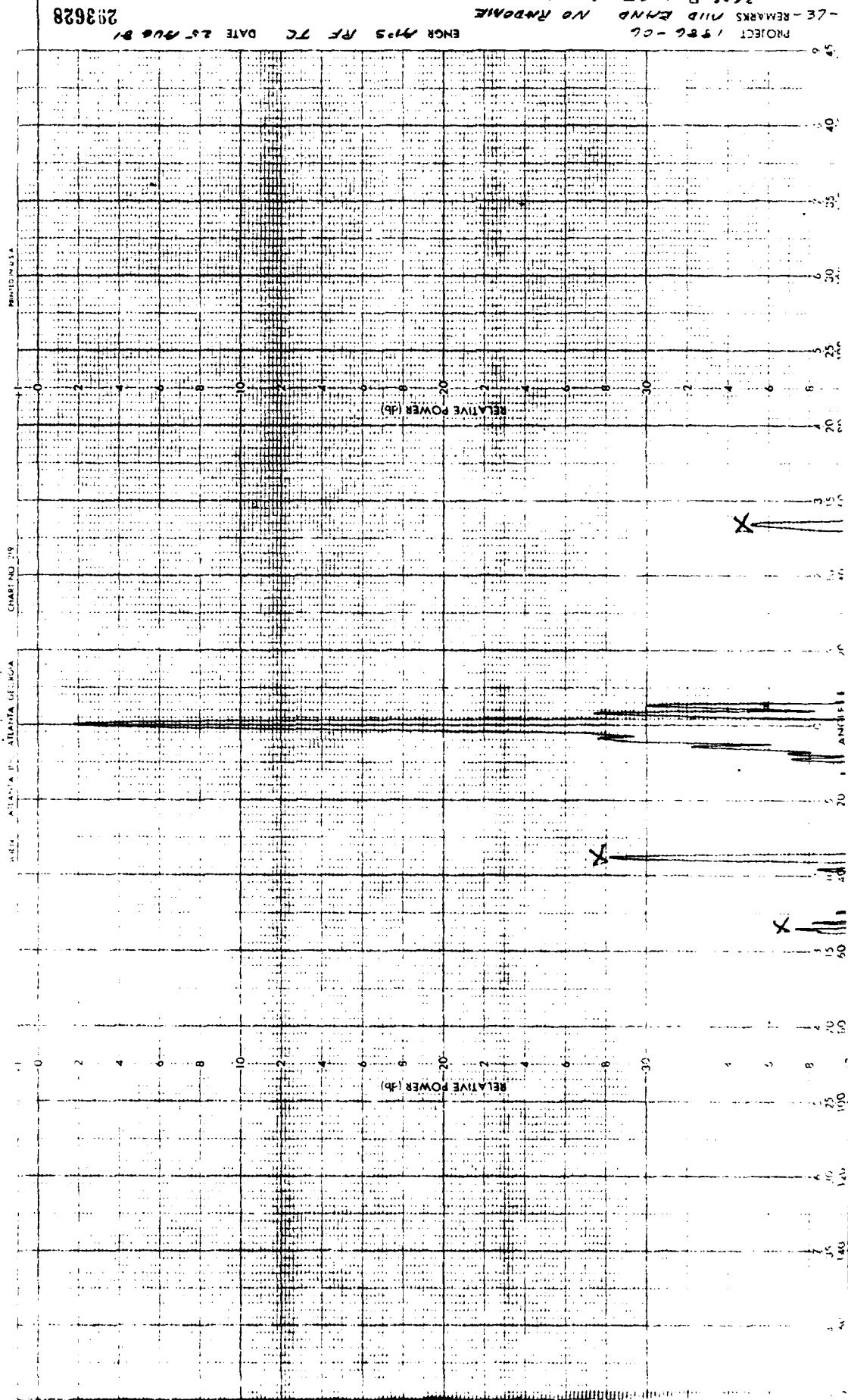
2300 WZ +20° EEL



36C - 65 MARKS 1111C BURNS RADARNE ON  
DATE 25 NOV 68 ENGR 4705 AF 7C 308634



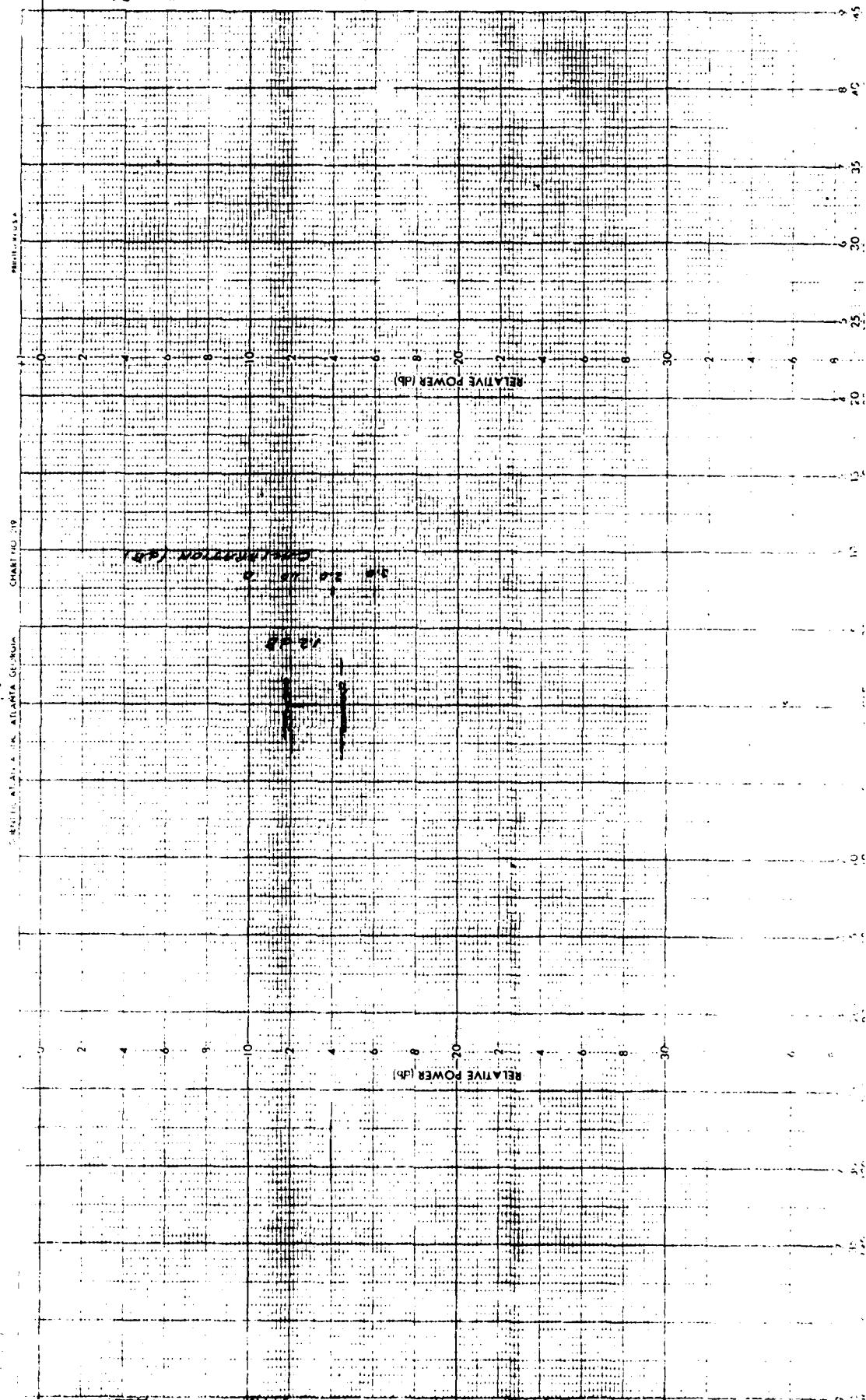
-36C. RUN AT 0°EL ANGLE  
-LE - REMARKS N11D ENND NO RNDOMIE  
PROJECT 1886-C6 ENGR MHS RF TC DATE 25-JULY-81



2; 3629

-86- REMARKS WILD END Tx 6055  
PROJECT 1886-06

ENGR 4705 RFE TC DATE 25-APR-06 81

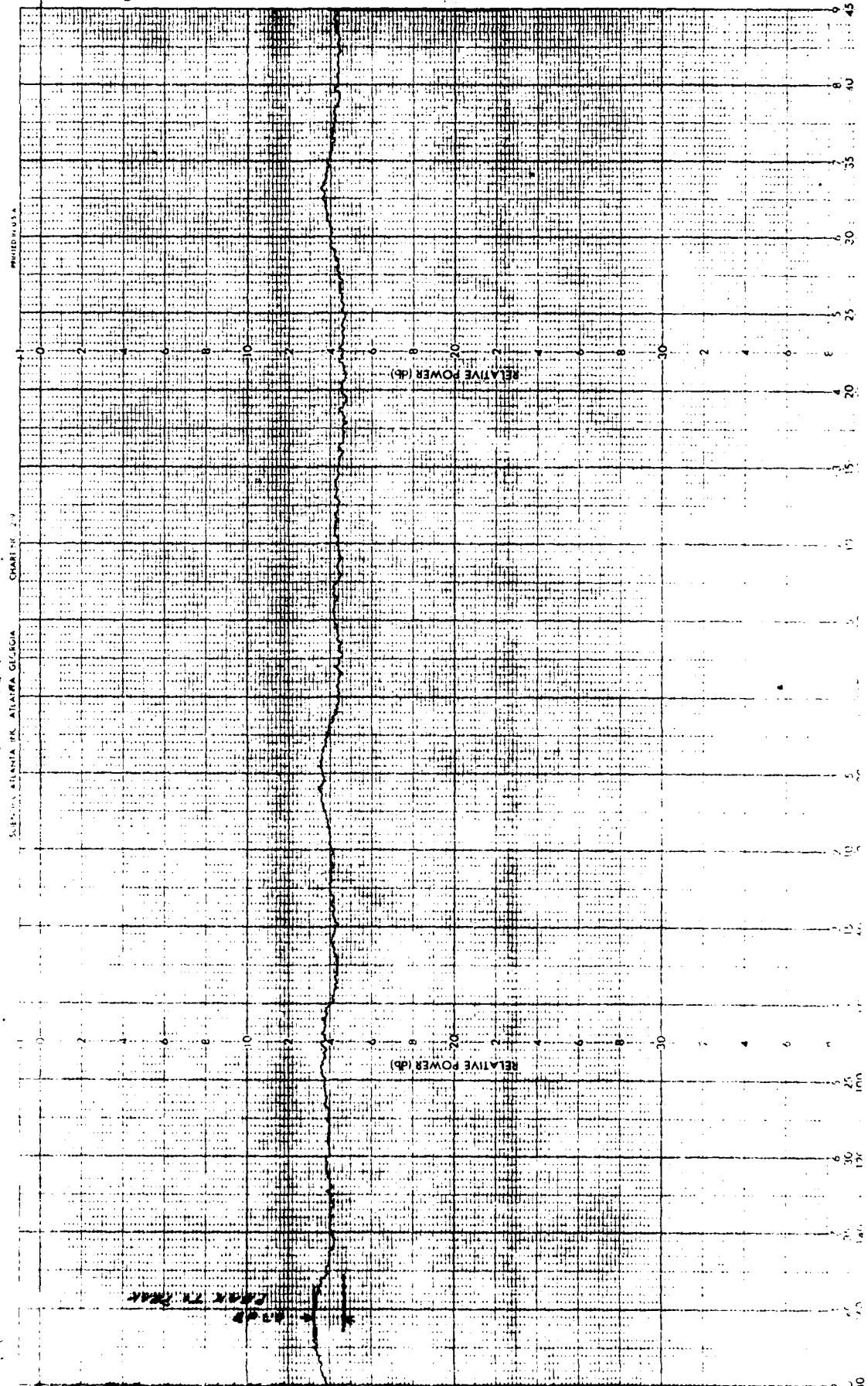




PROJECT 1886-66  
-04 - REMARKS N11D B1N1D 360. LOSSES

293633

15



REMARKS NUMBER 360. LOSS  
PROJECT 1936-C6

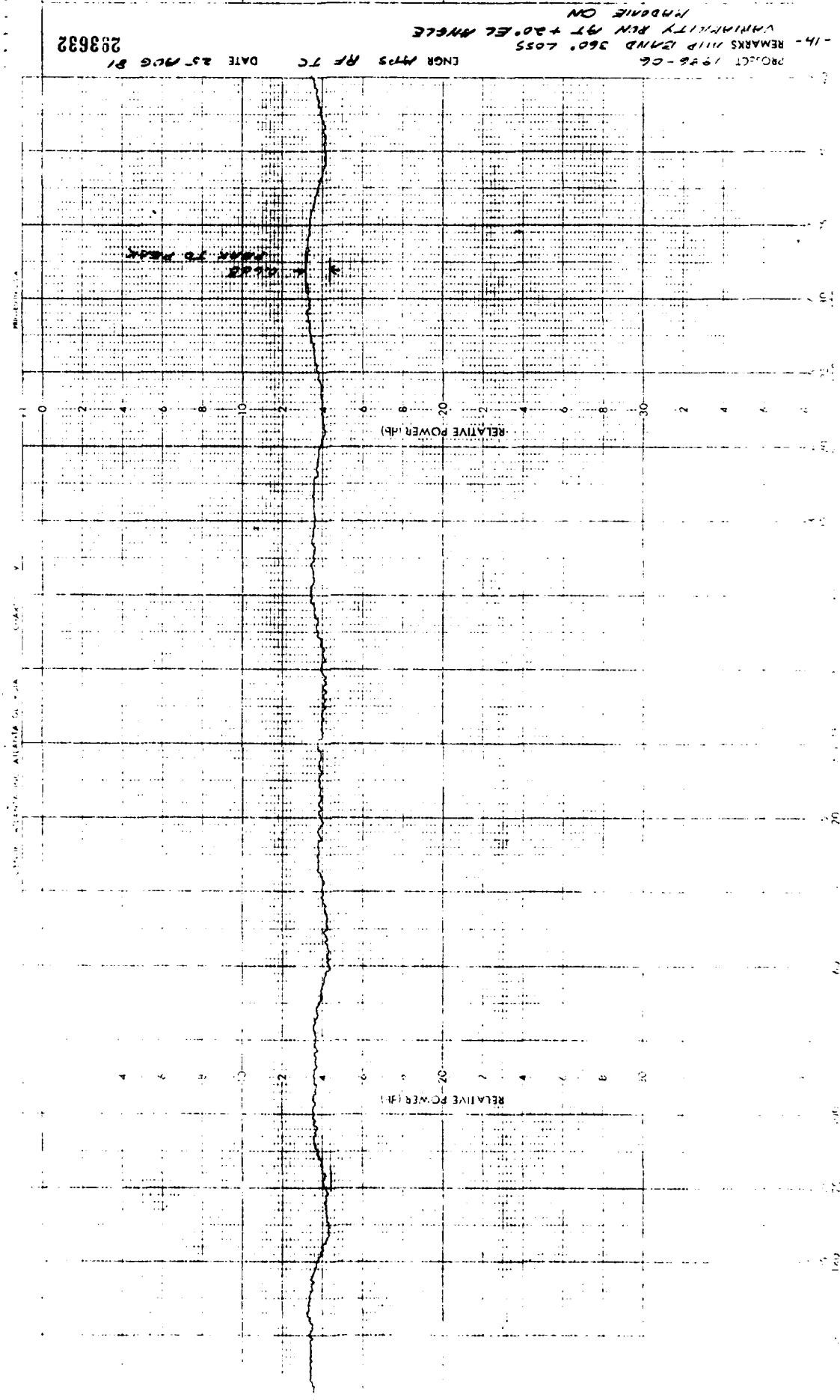
DATE 25-MUG-81

ENGR MTS RF TC

293632

-1H - REMARKS NUMBER 360. LOSS

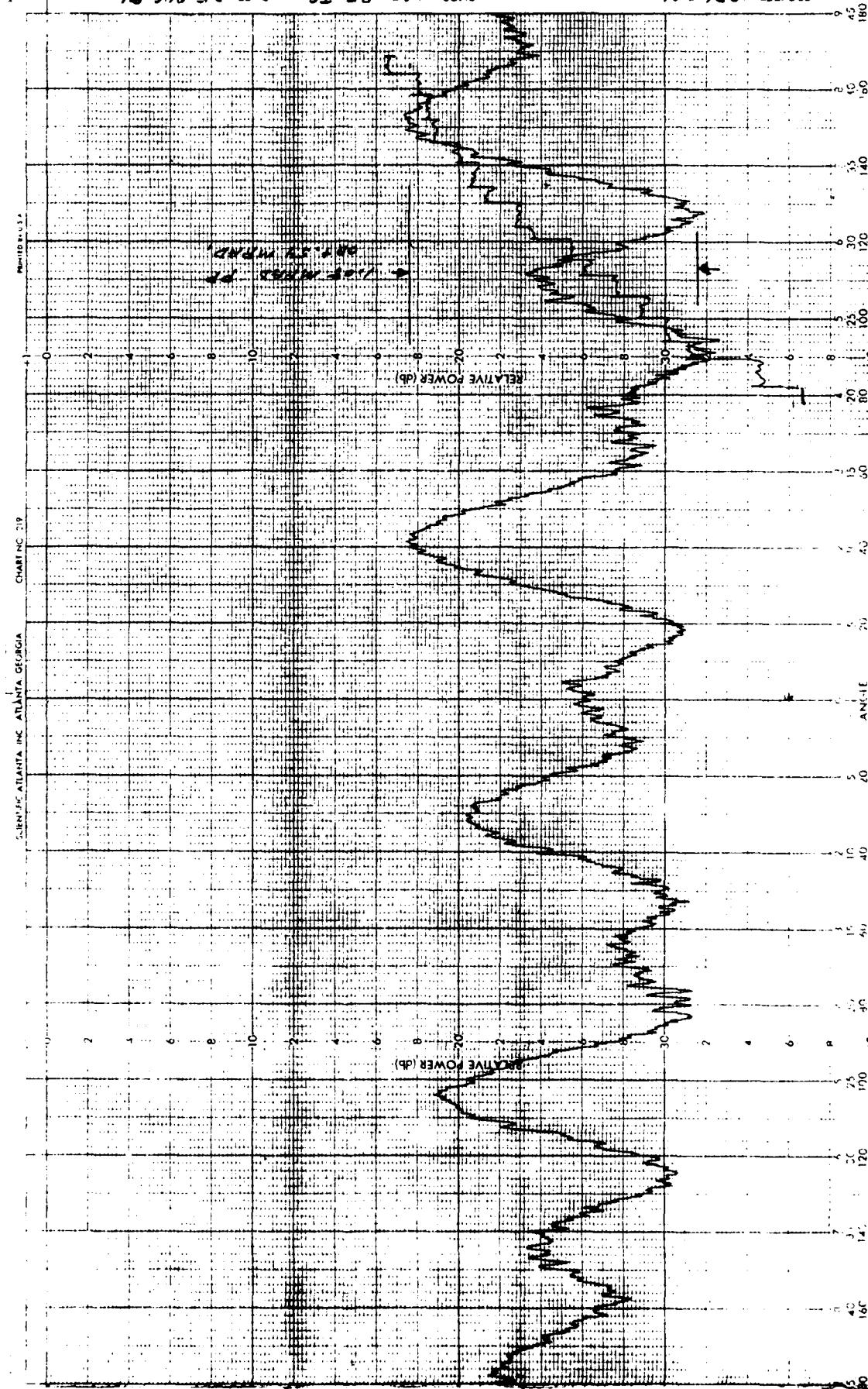
VANISHING POINT REC AT +20° EL ANGLE

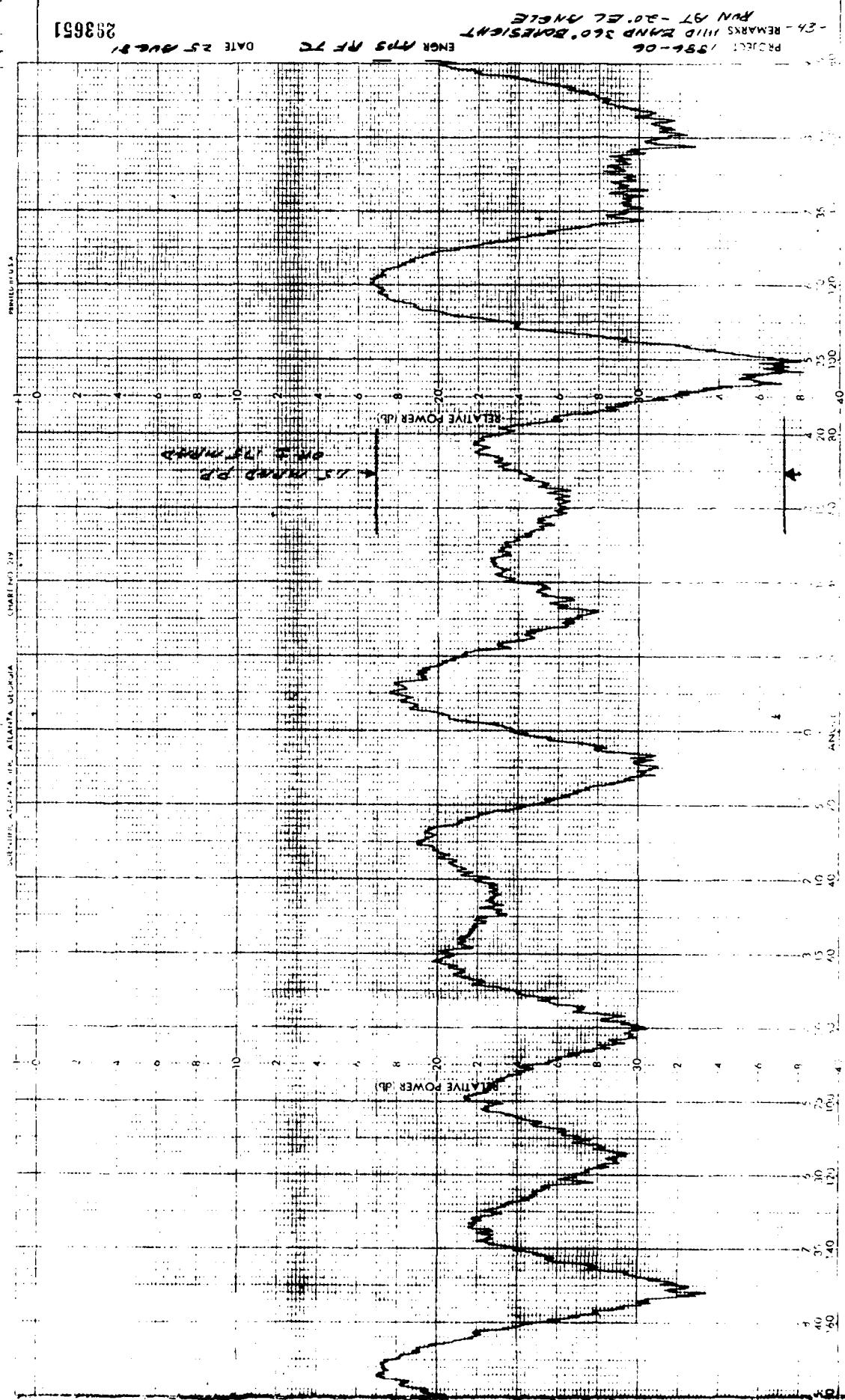


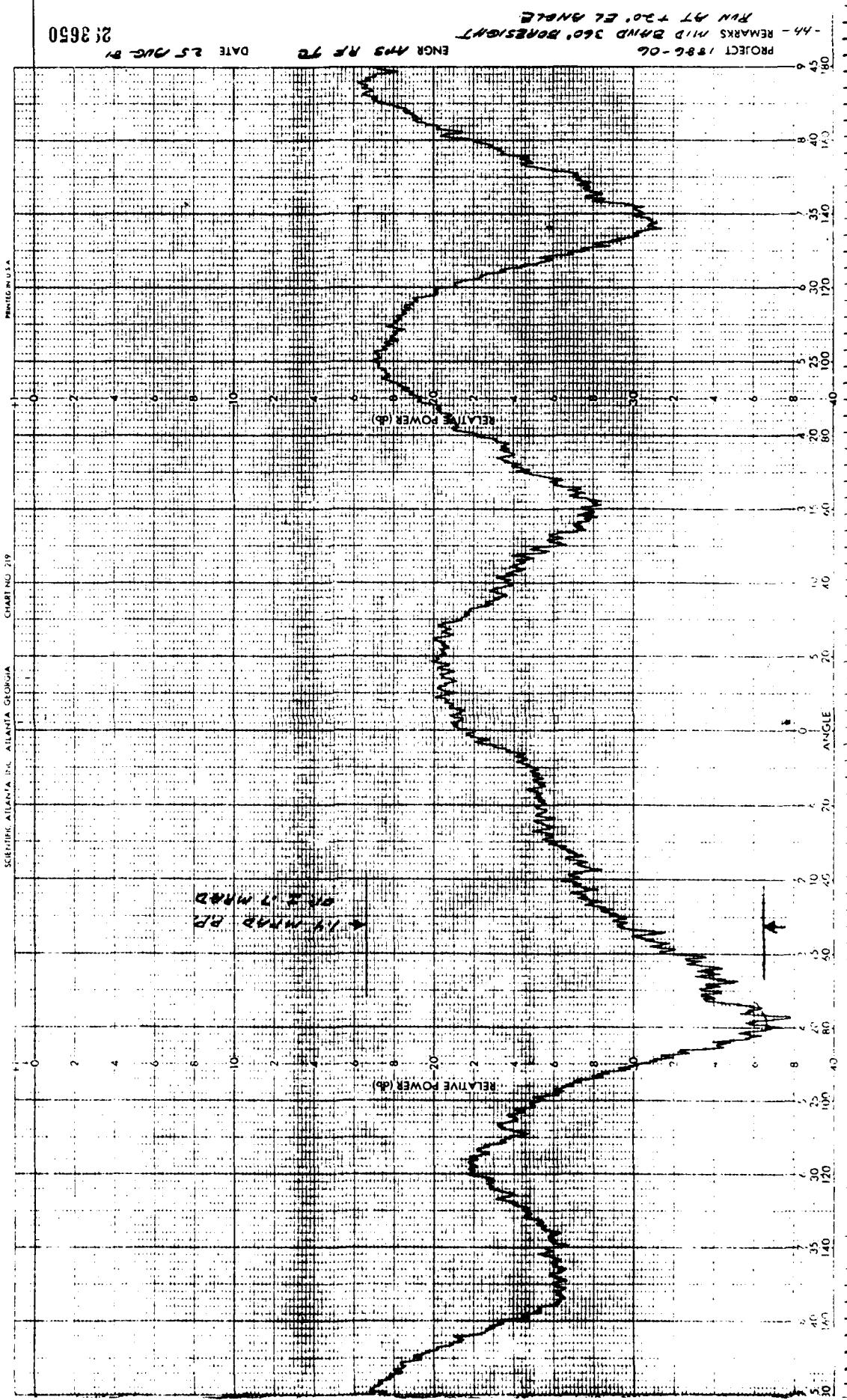
293649

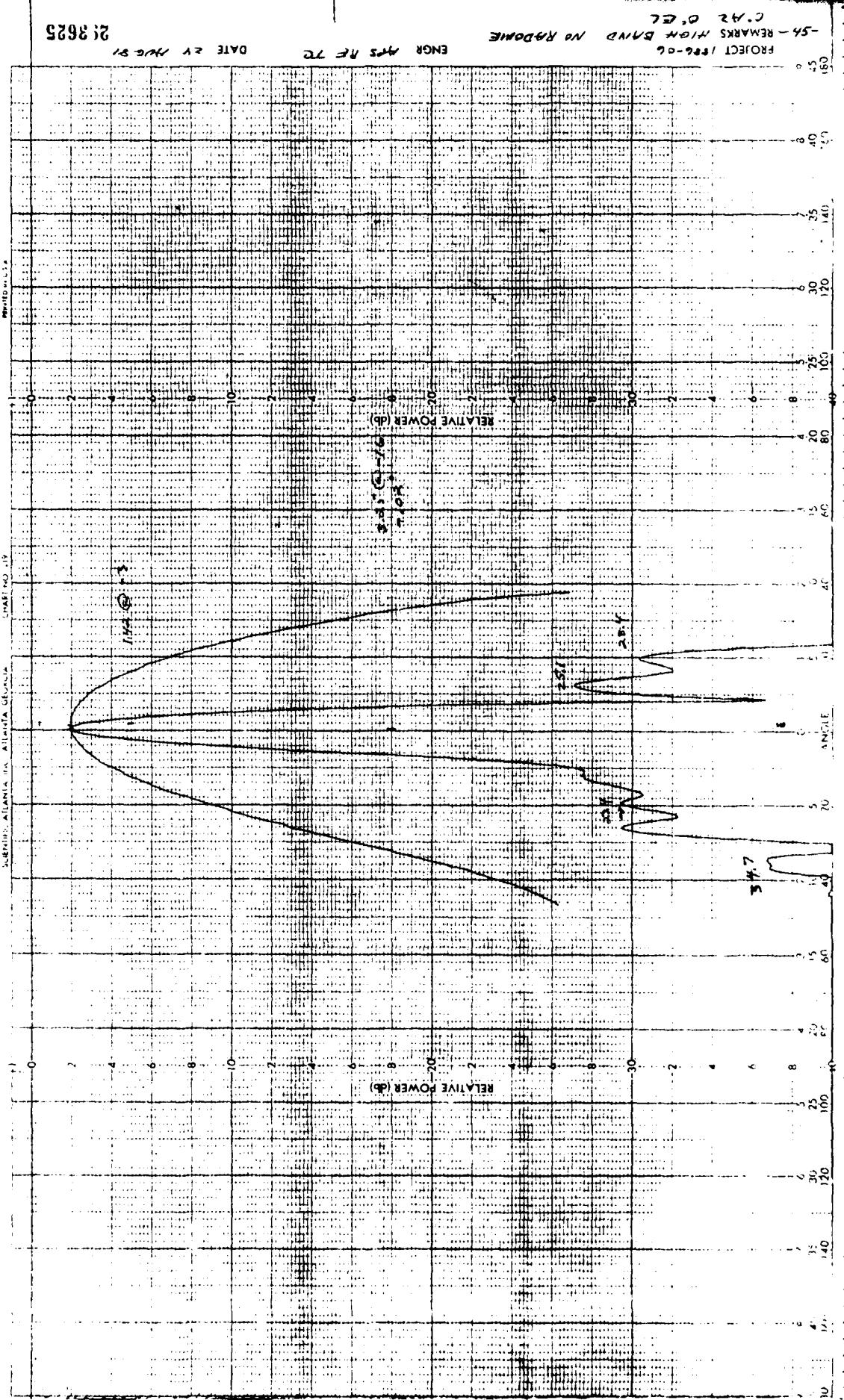
24- REMARKS WILL BE MADE 360° BONESHOT  
PROJECT 1856-06  
RUN AT C. 65 ANGLE

ENGR 4705 RF TC DATE 25 AUG 81

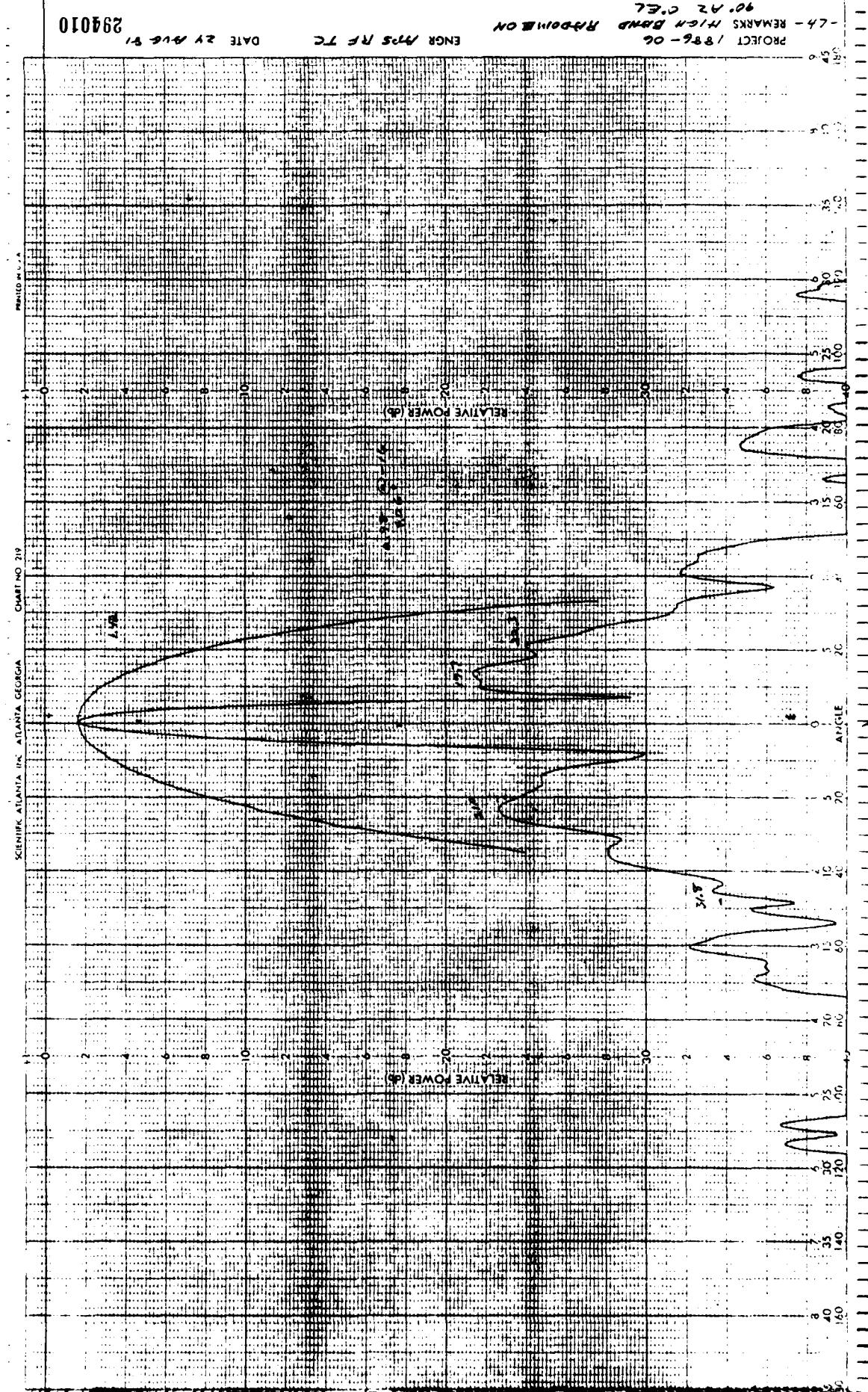


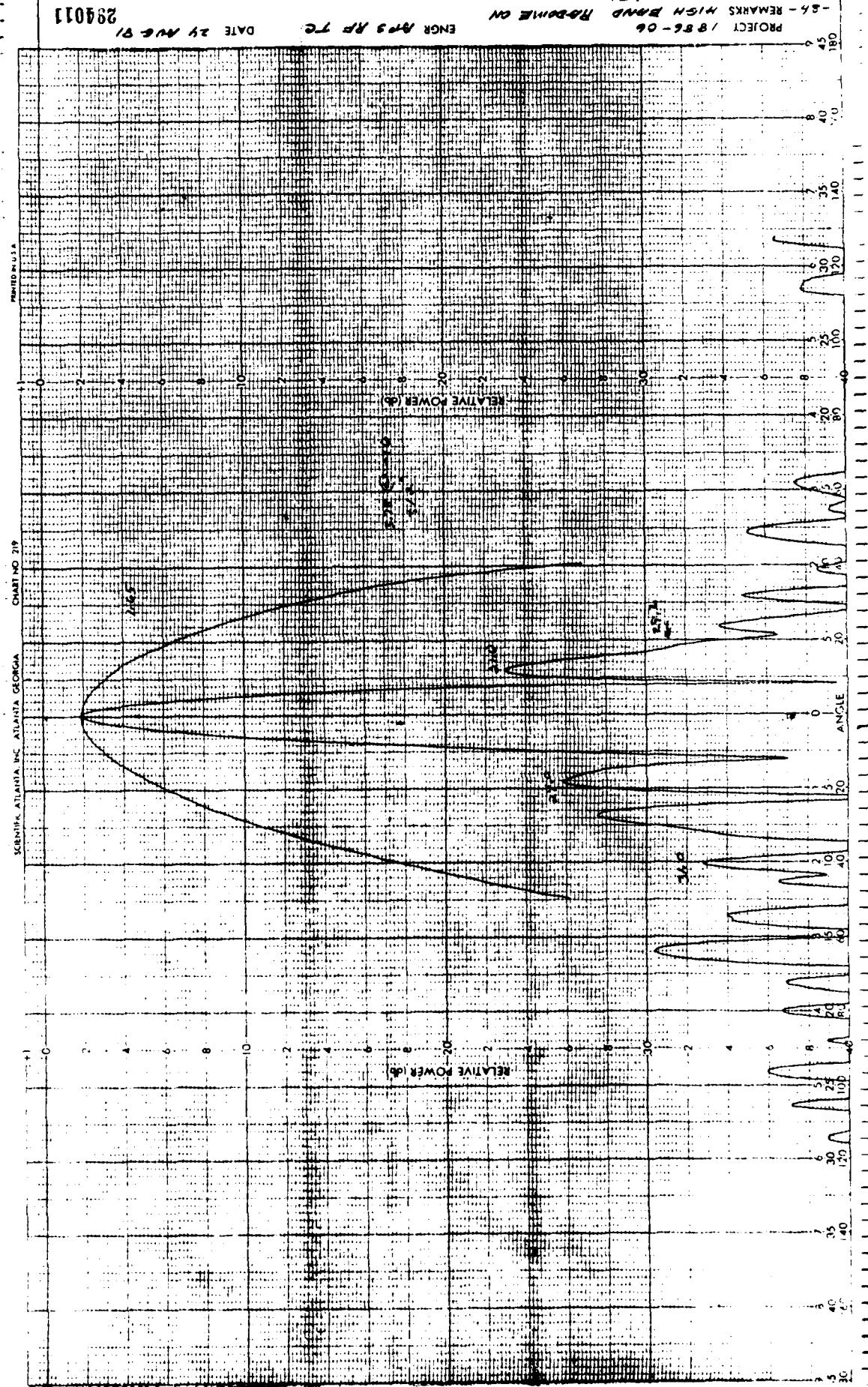




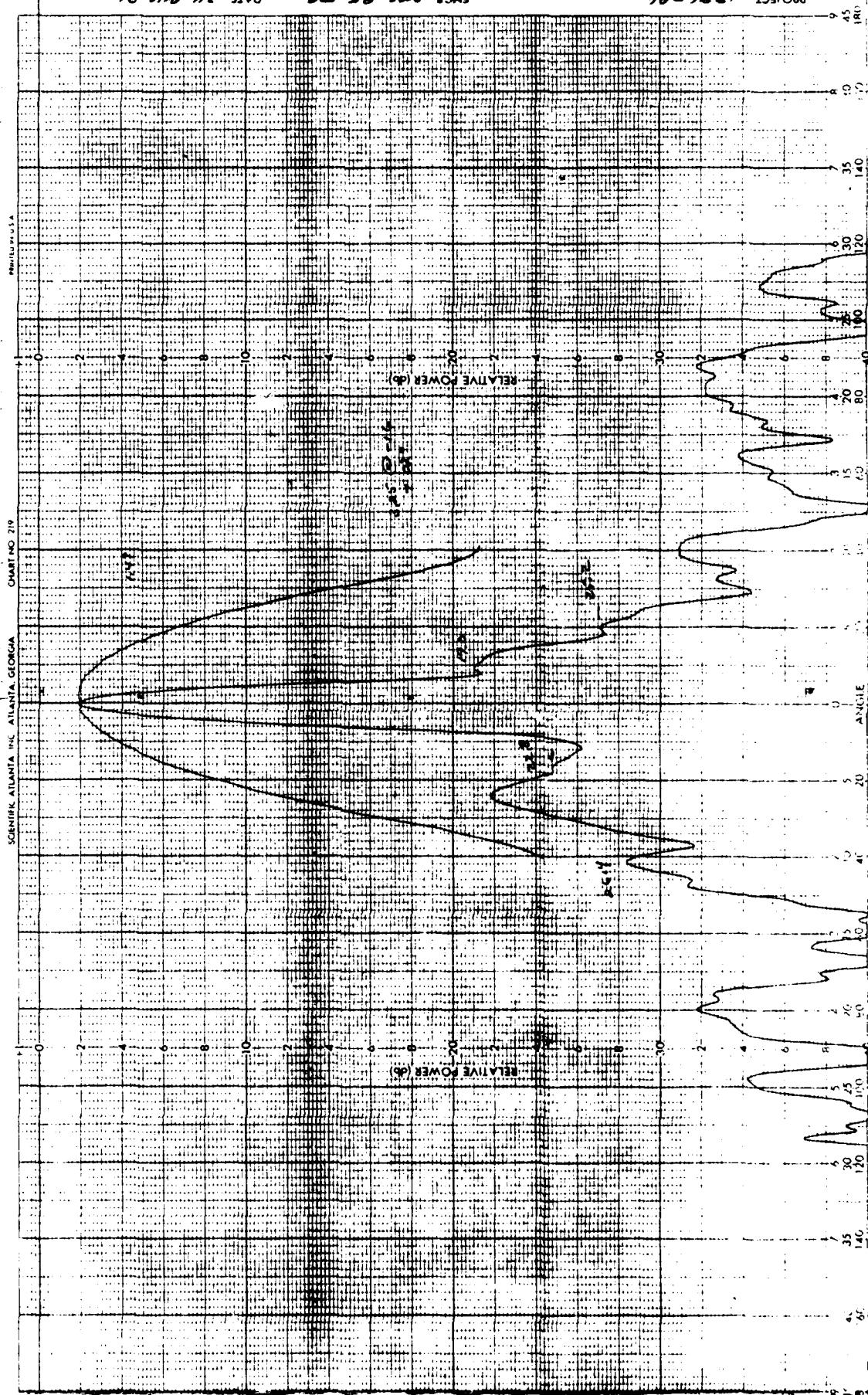








PROJECT 1836-06 ENGR AP73 AR TC DRAWING NO. 294012  
-64 - REMARKS HIGH DRAFT DATE 24 APR 81



293616

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TC DATE 27 AUG 81

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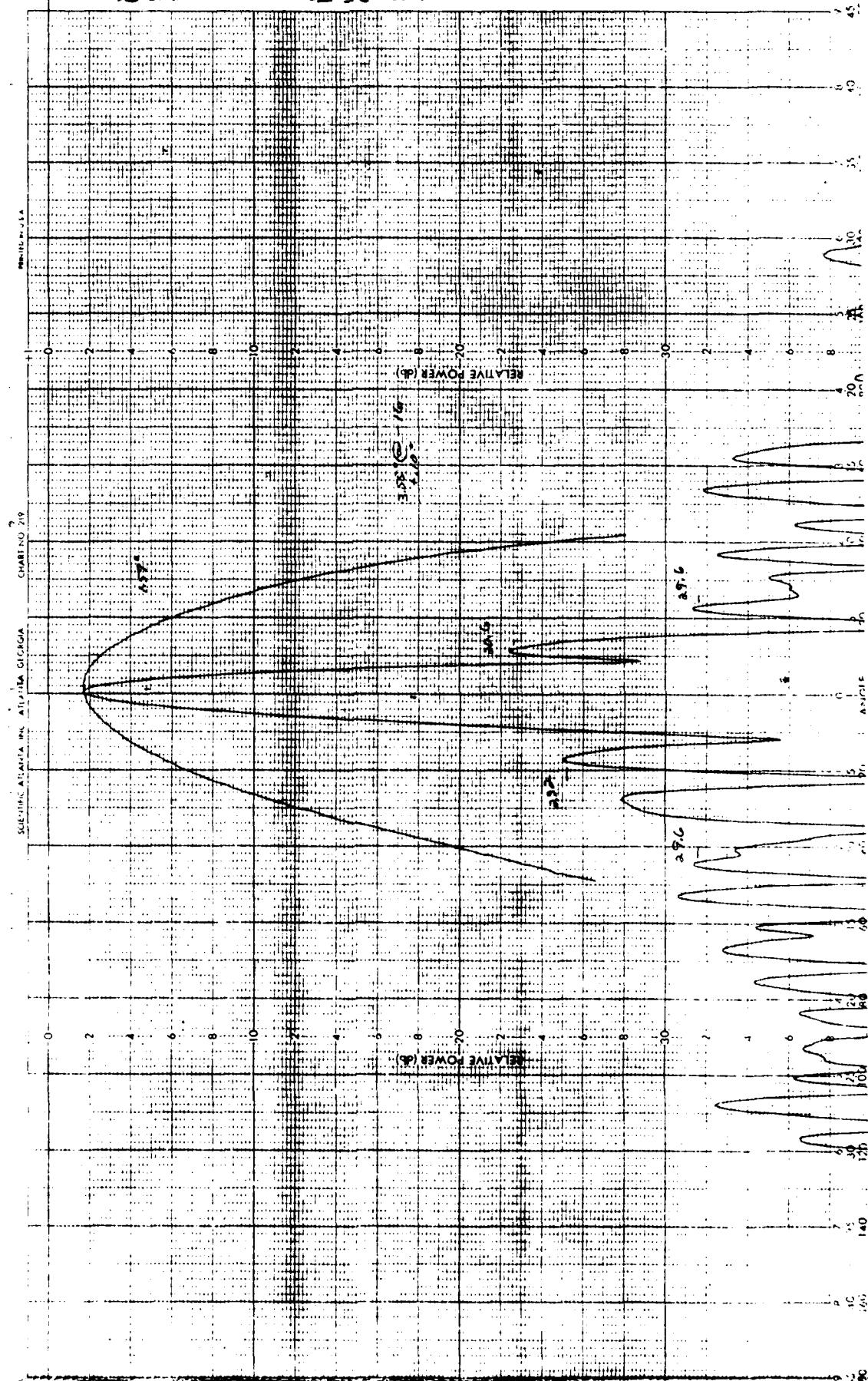
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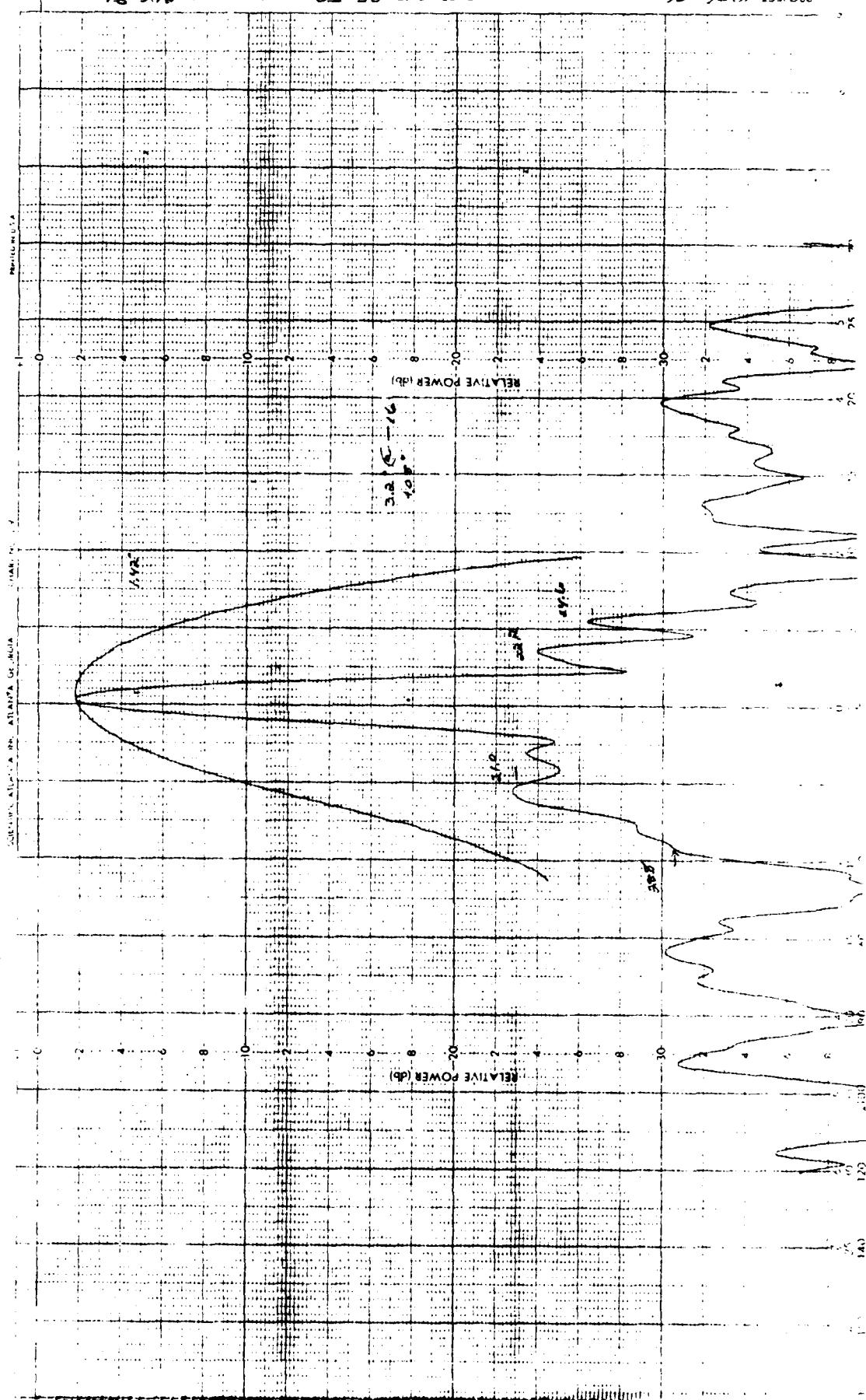


293617

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PROJECT 1886-06  
15 - REMARKS HIGH BAND RADIOMICS ON  
ENCR ATTS RF TC DATE 24 NOV 81

90. A2 - 30. EL



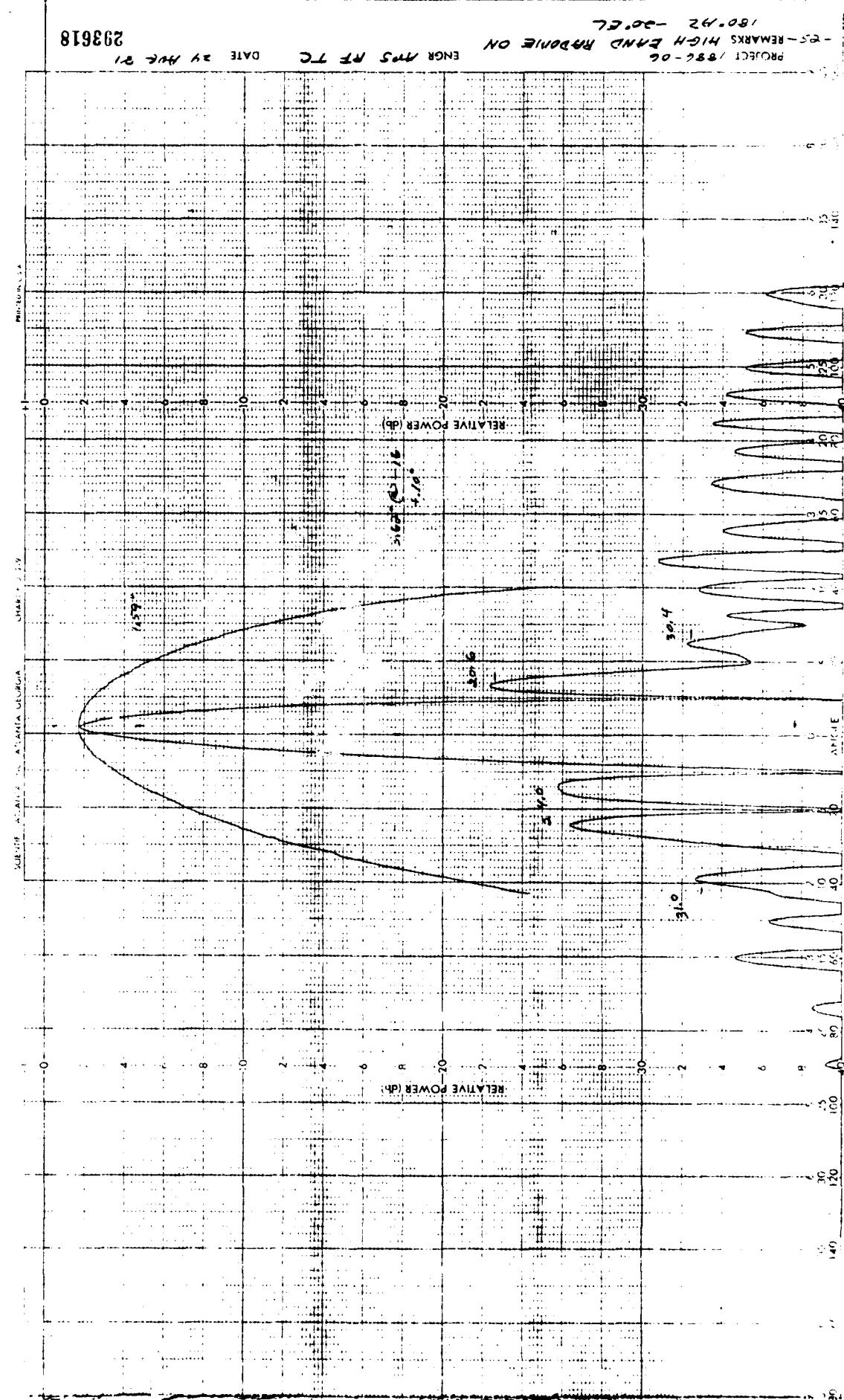
293618

72.00- 24.00

- 52 -

REMARKS HIGH AND RESPONSE ON  
PROJECT 22-28-1

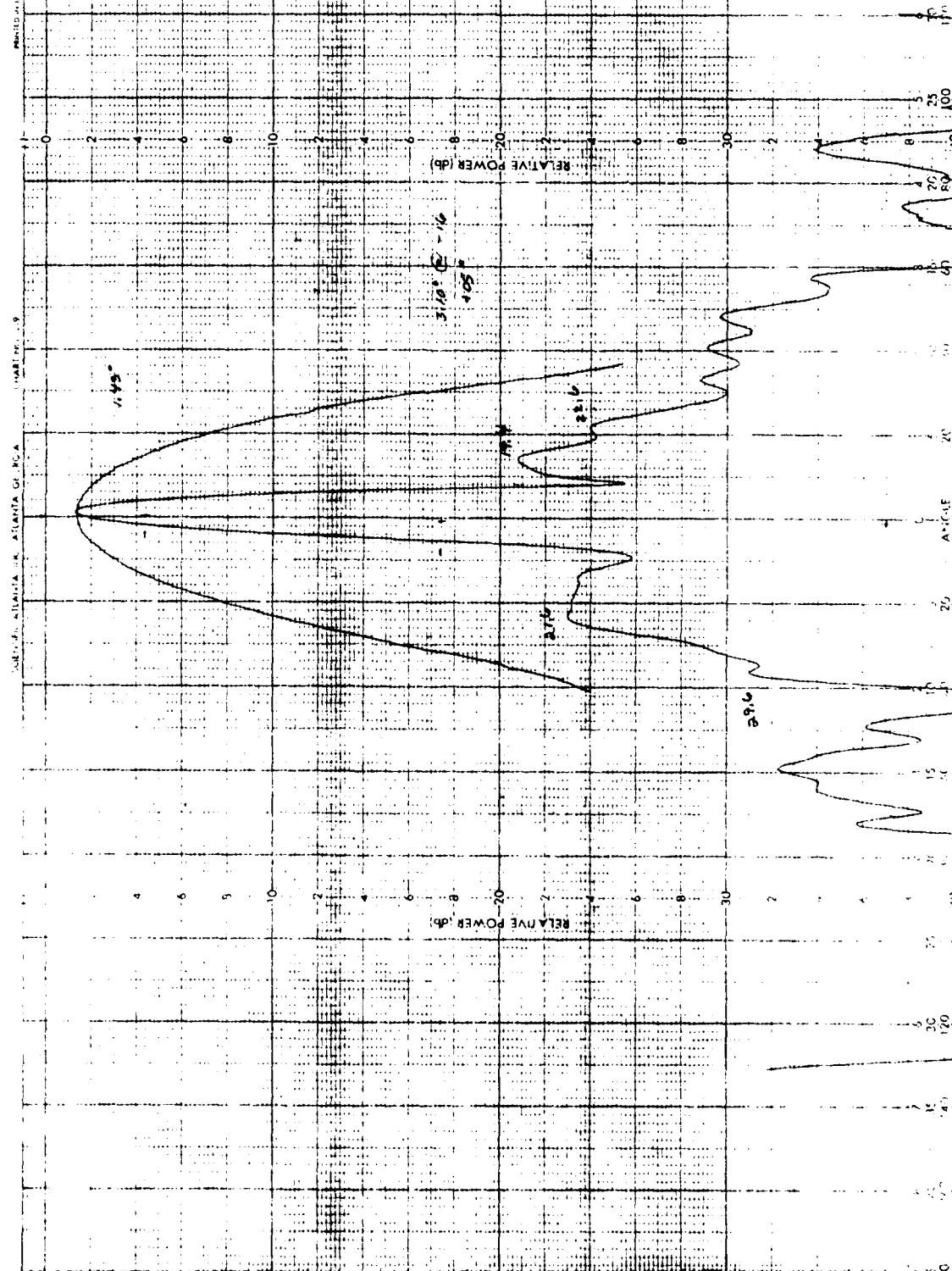
ENGR MRS RF TC DATE 24 MAY 81



293619

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PROJECT 1386-0C ENGR APPS RF TC DATE 21 AUG 81

30.42 -20.36  
-35 - REMARKS HIGH BAND RADIOPAC ON

234013

DATE 23 NOV 88

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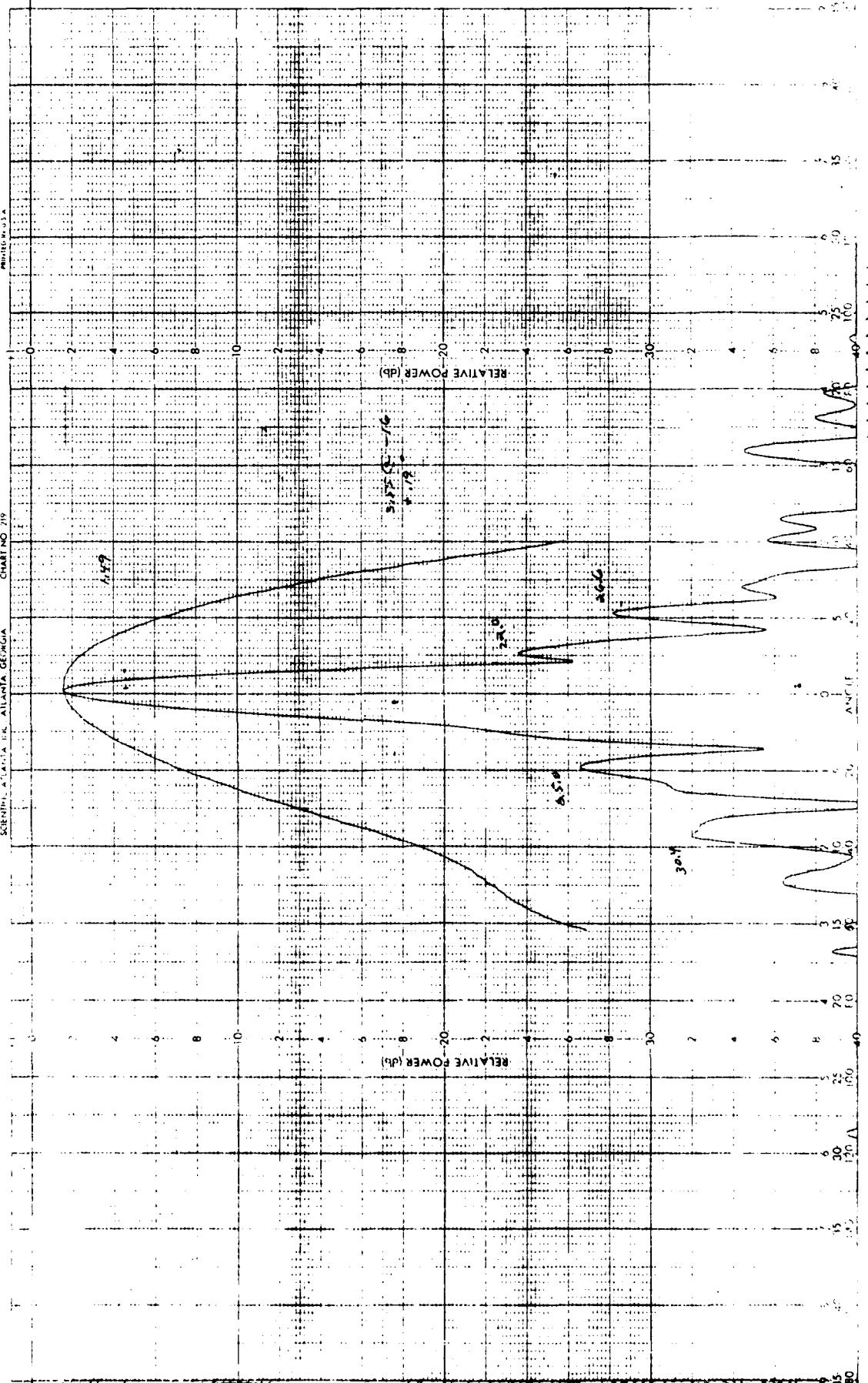
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ALL INFORMATION CONTAINED



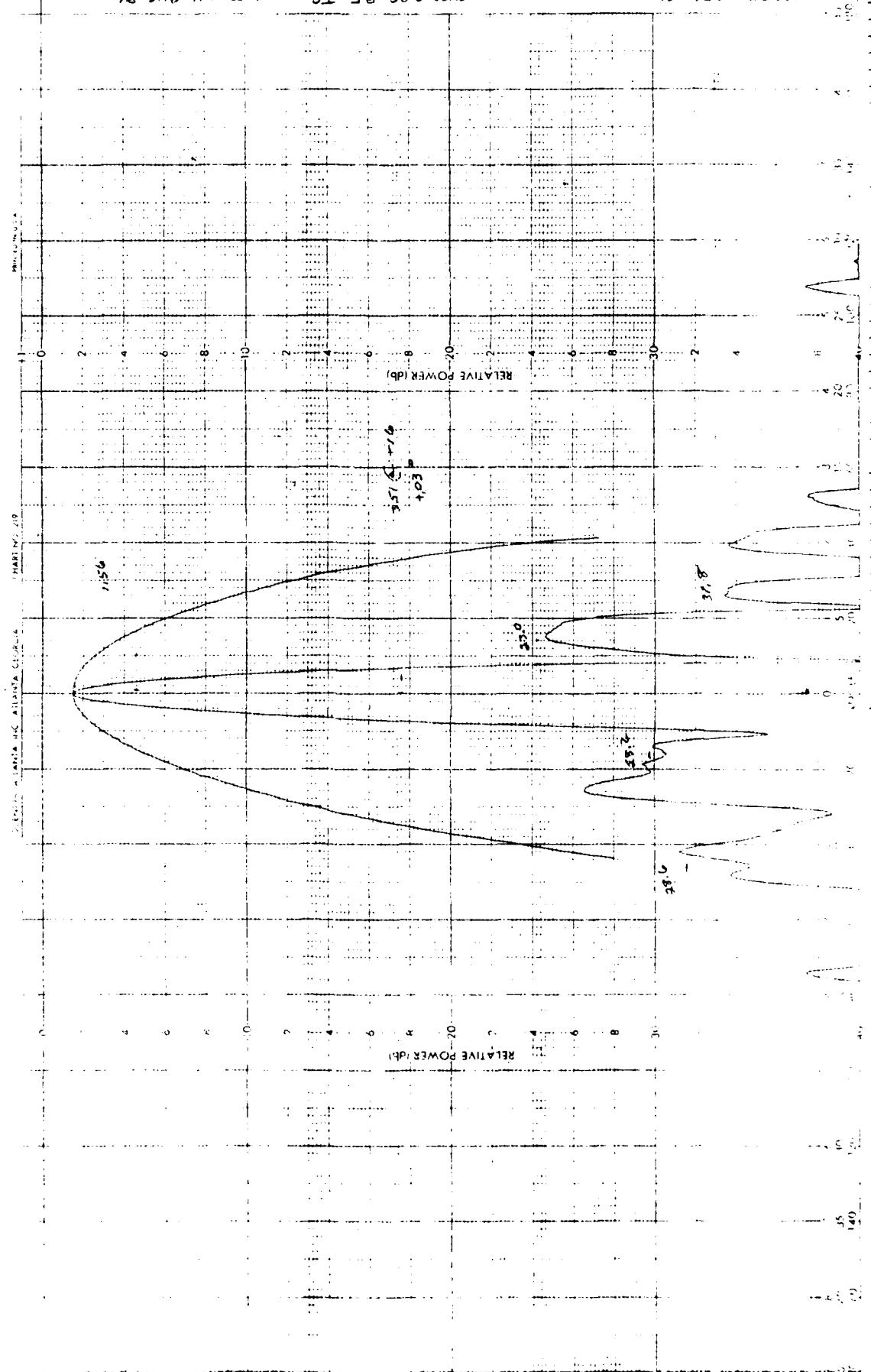


294015

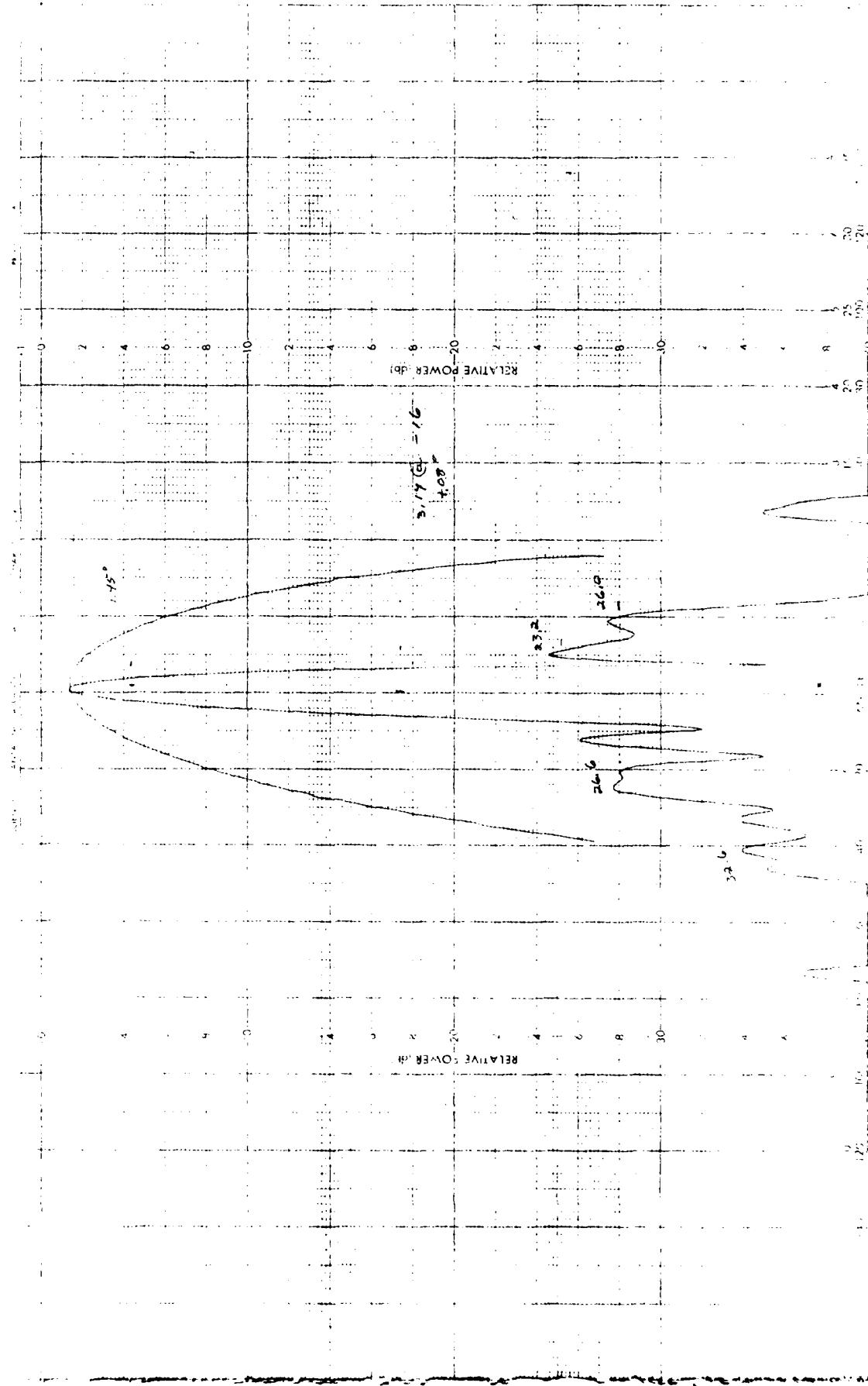
DATE 24 AUG 81

PROJECT 1286-66  
-93 - SEMARKS HIGH BAND RADOME ON

-90°, AZ +30° EL



254016  
DATE 24 NOV 65  
ENGR HHS RF TC  
-45-3000KHZ WHICH IS MUCH SMALLER THAN  
-20dBc 1936-66 30°EL

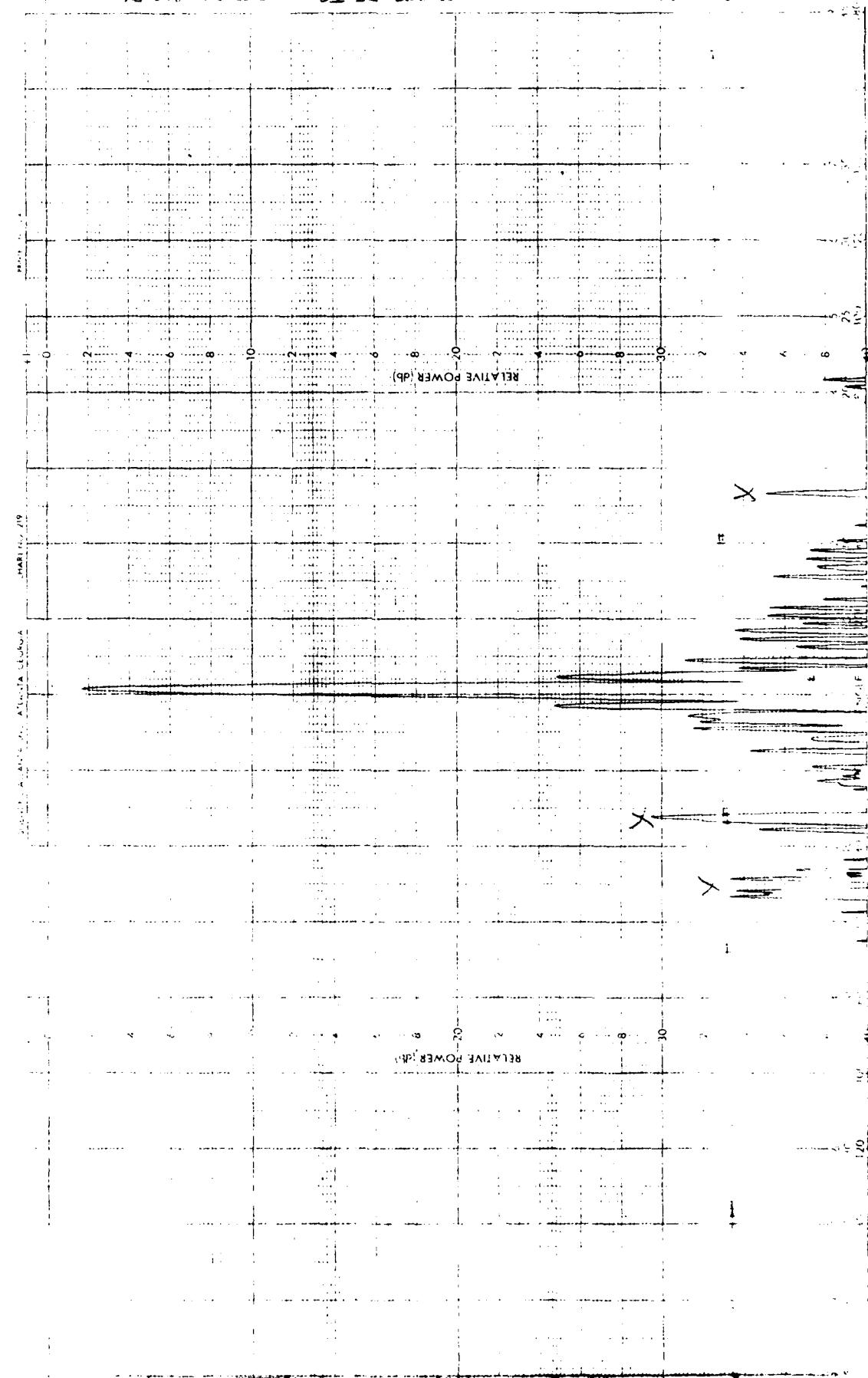


360° HIN AT C. E. ANGLE  
35 - REMARKS HIGH BAND RADAR CN

REC'DCT 18 APR 66

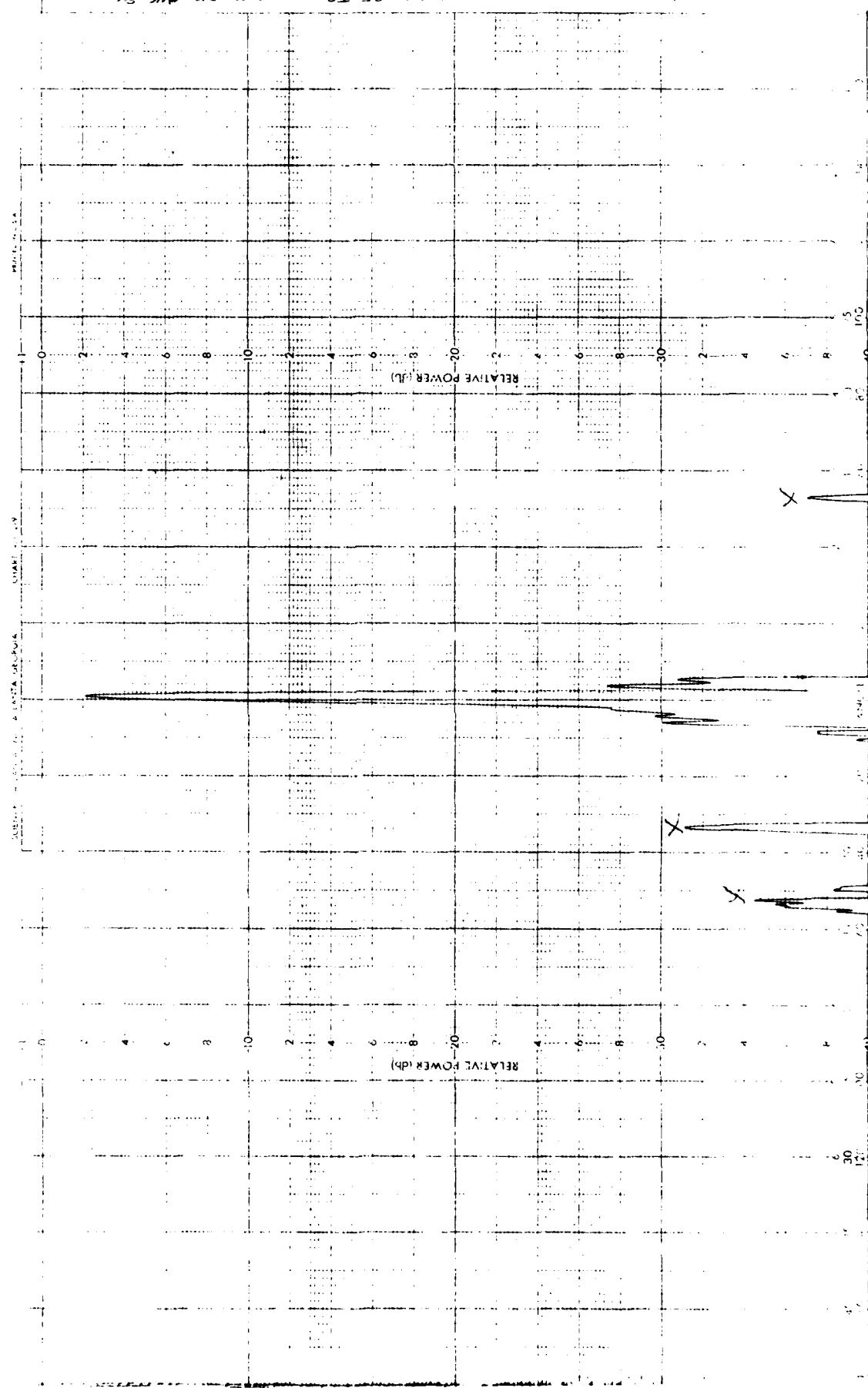
ENCL 355 RF TC DATE 24 APR 66

293620



293626

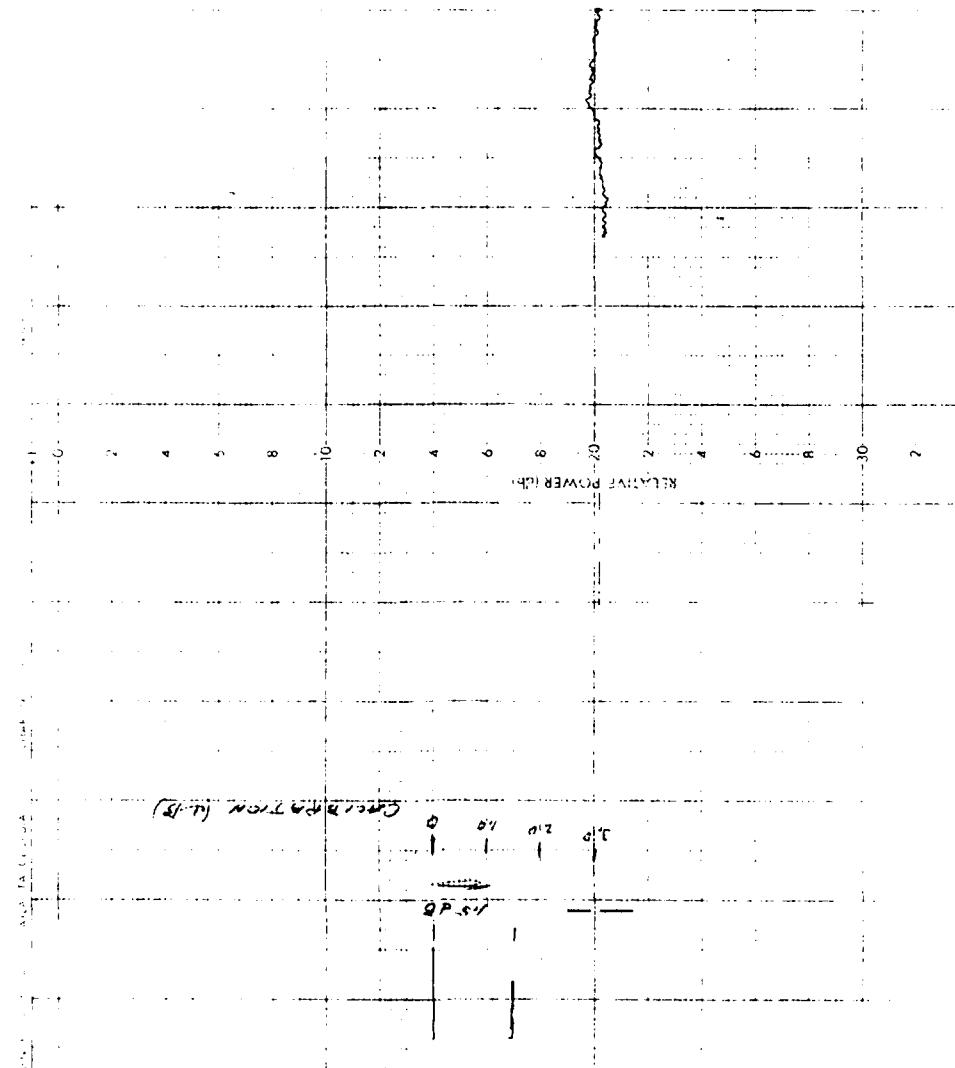
ENGR MTS RF TC DATE 27 NOV 51

-63.0 dBc HIGH PEAK NO HARMONIC  
360. Hz AT C/EL RANGE

5507 TX LOSS  
42-26-1966

213624

ENCR APRS 1967 TC DATE 4/1966 51



Relative Power (dB)

15.00

14.95

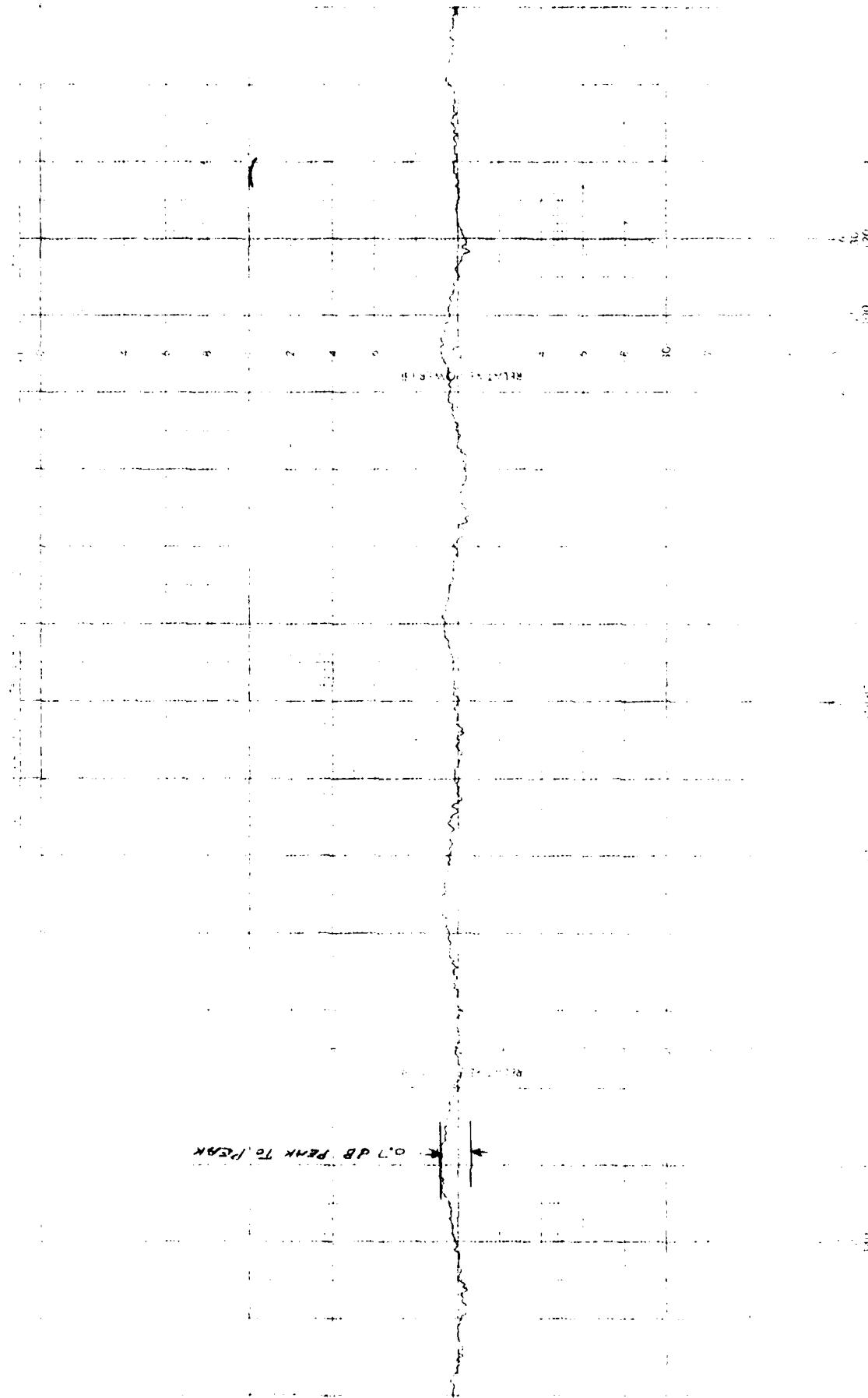
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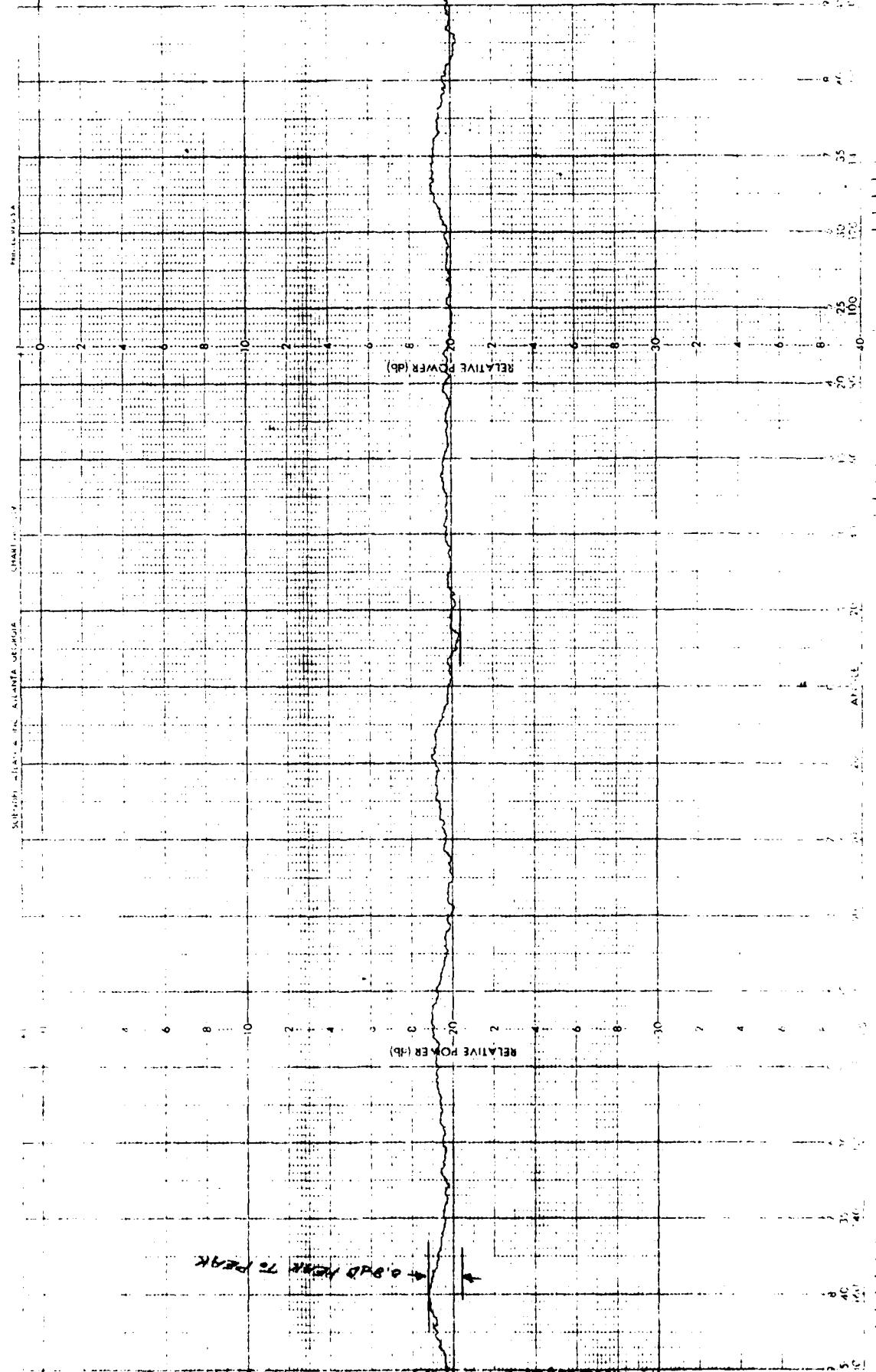
UNARMED C/N

-29 - REMARKS HIGH BANK AT 20° EL ANGLE

PROJECT 1986-CG DATE 21 NOV 81

293623

ENCR 4425 NE TC DATE 21 NOV 81



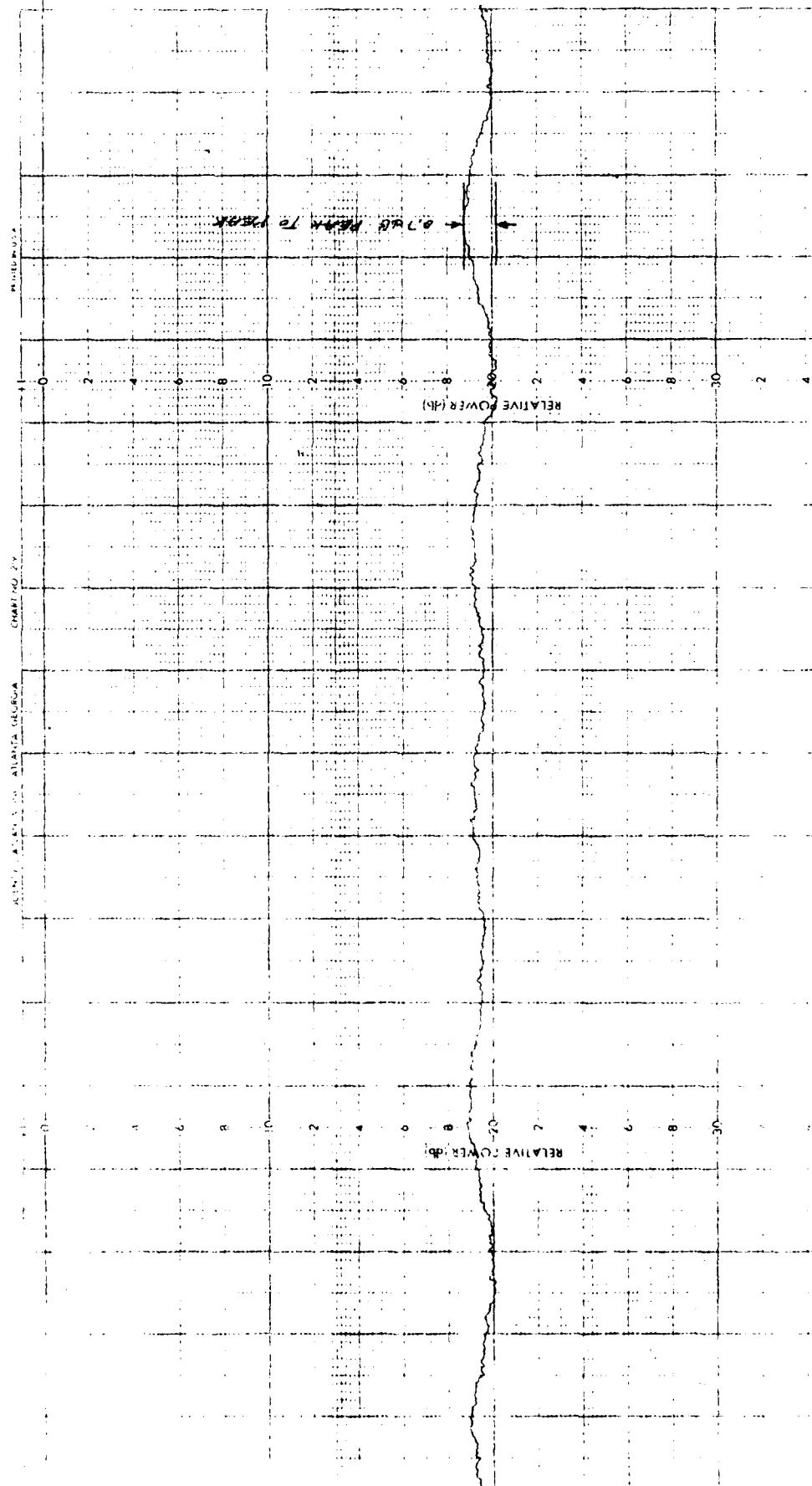
RADOME ON

-69 - REMARKS MECH BAND 360.0055

PROJECT 1986-0C

203622

ENR 9325 RF TC DATE 24 AUG 81



204005

DATE 21 AUG 81

TC

ENR

ATC

XIN 97 C. 2L NNGECE  
- 69 - 121 1983 HIGH END 360° BORESIGHT

1986-CC

SOURCE: ATLANTA EMC ATLANTA, GEORGIA

CHART NO. 19

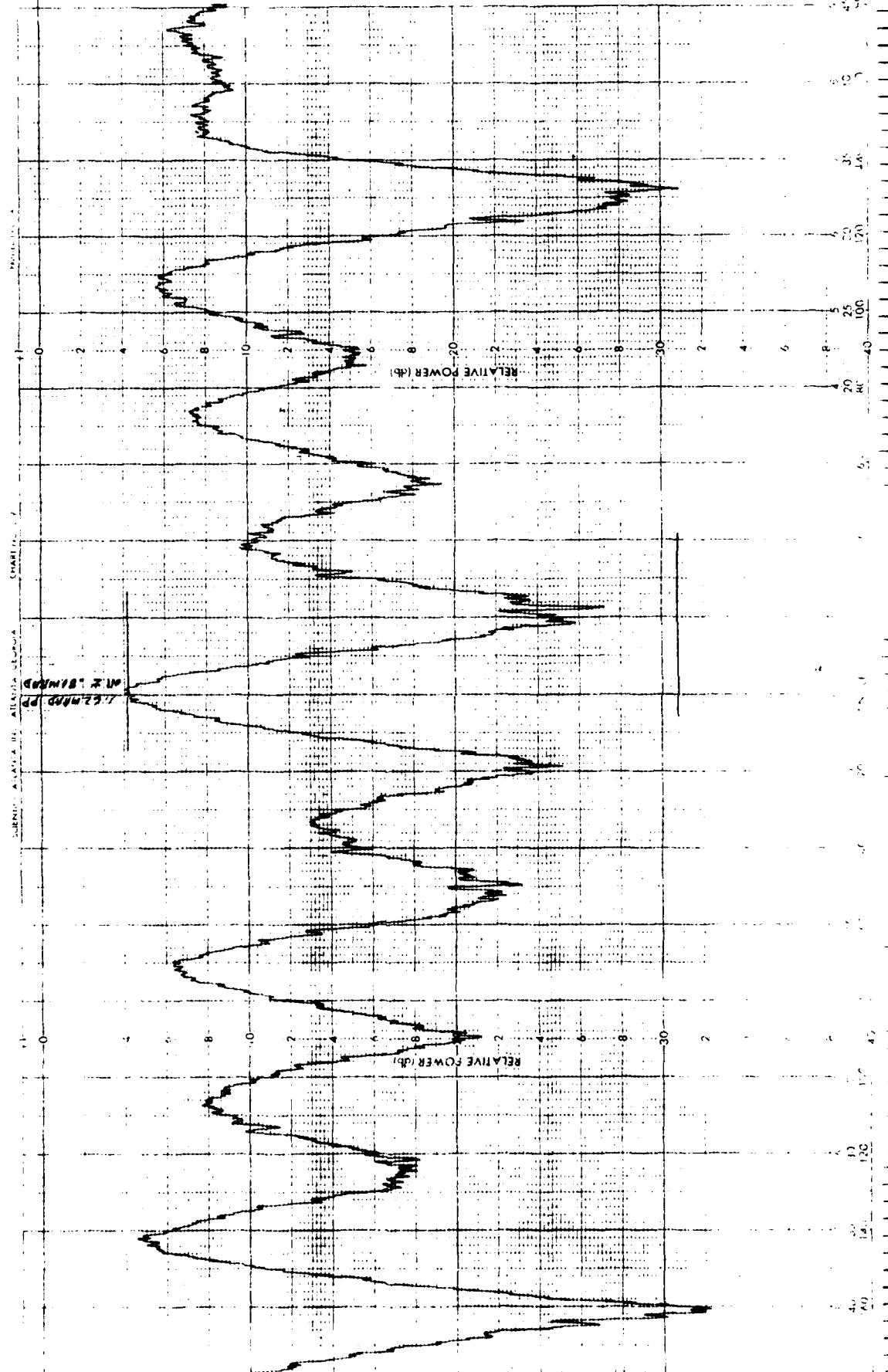
DATE: 21 AUG 81

TIME: 204005

FC:

204007

PROJCT 1986-06 ENGR ATS RF TC DATE 24 JULY 81  
-59 - REMARKS HIGH GAIN 360° BONE SIGHT



294006

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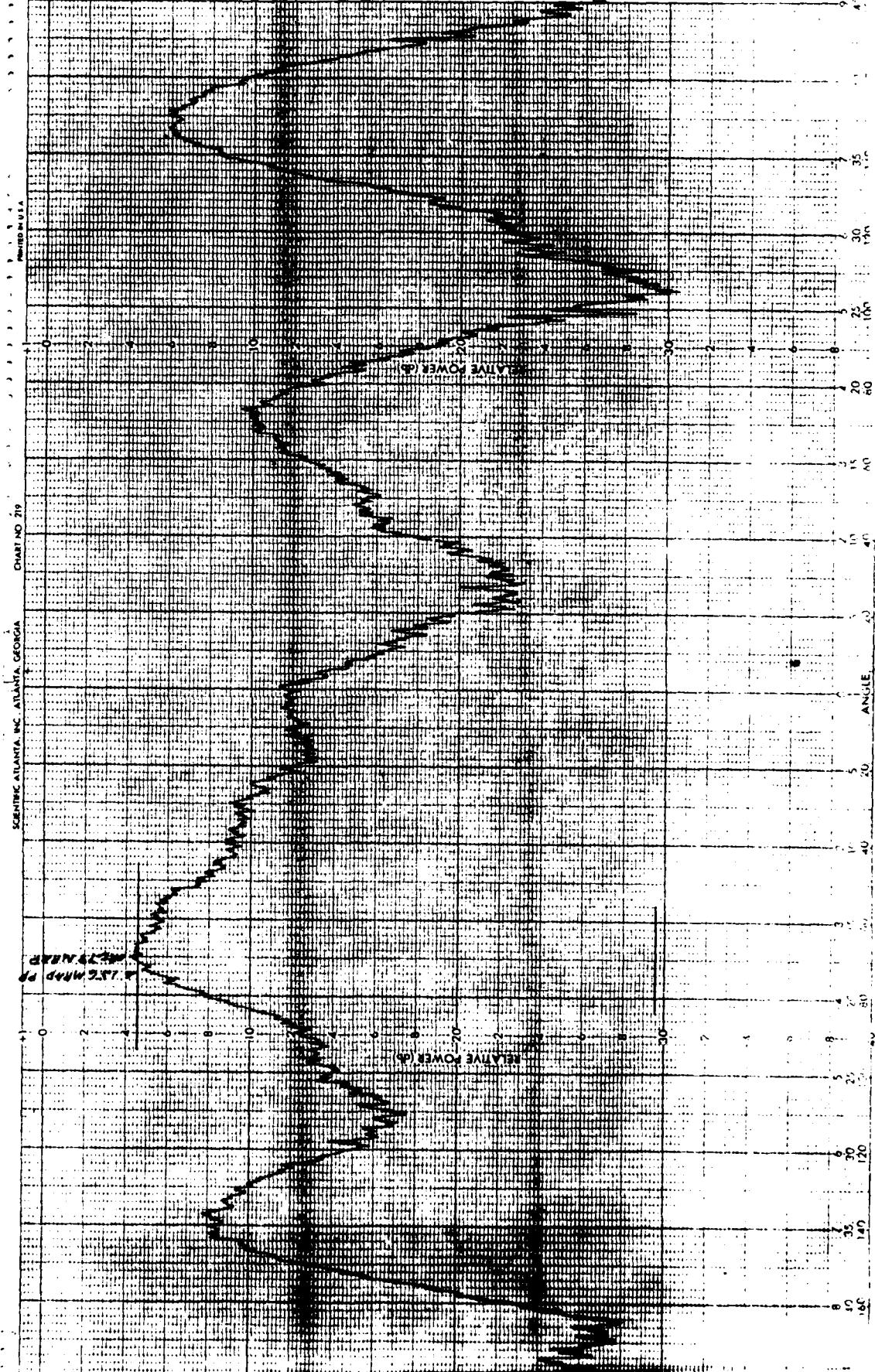
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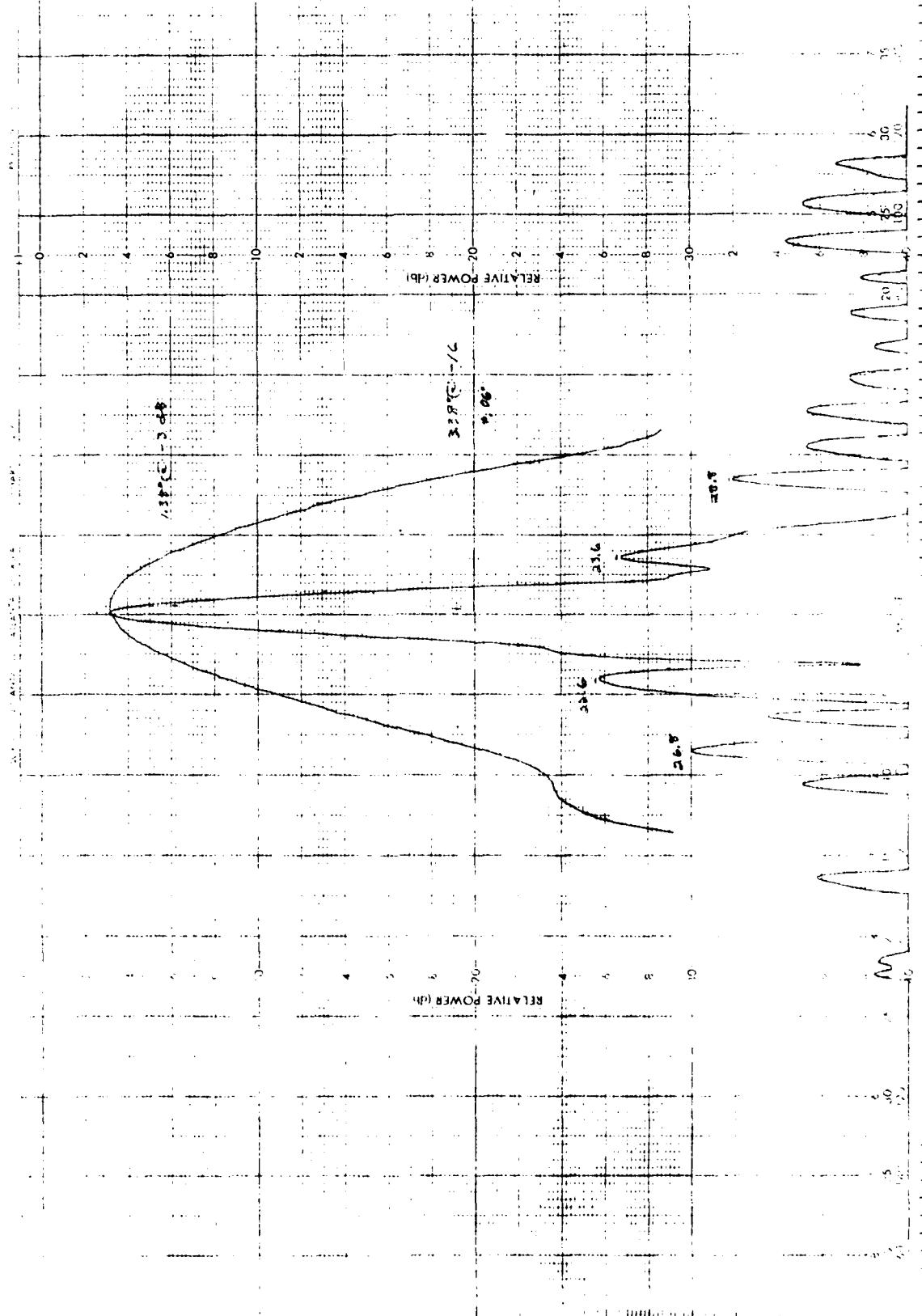
2668 12

24 SEPTEMBER 1948

72.0 74.0

110-76-8000 RADOMER 36C71C 111TH X-1 PILOT

35 - 67 -

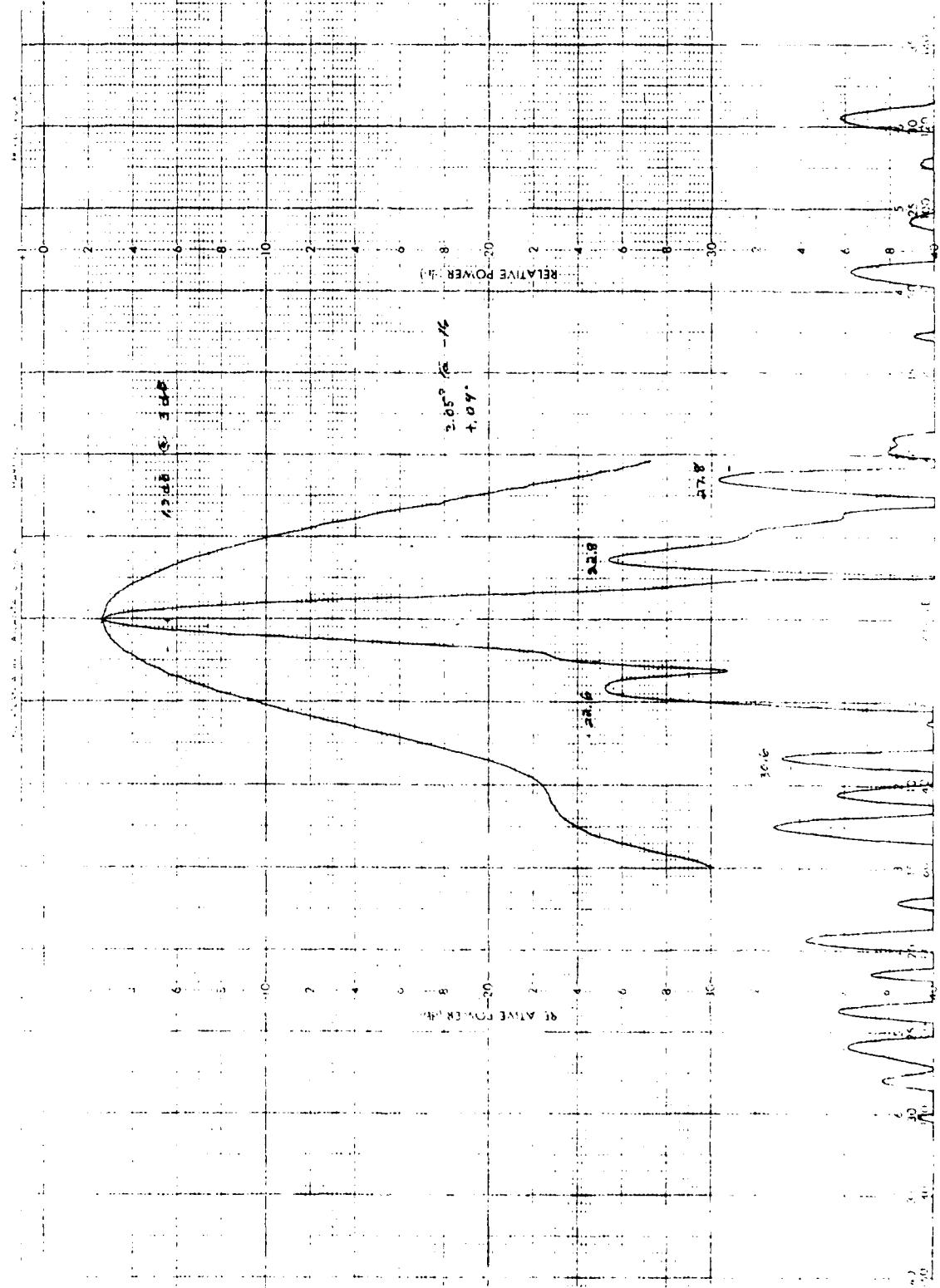


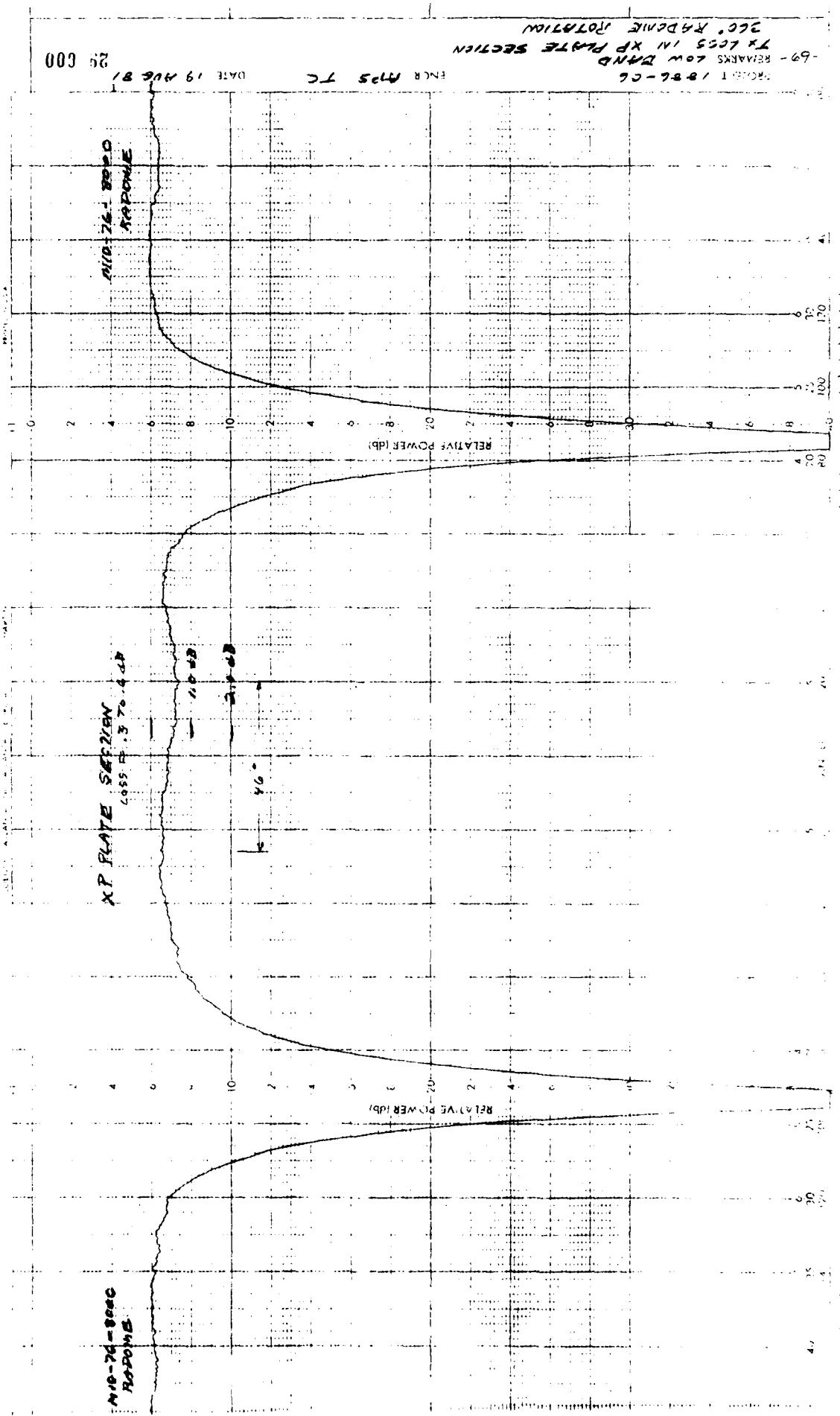
REMARKS M10 BNI  
-87- 1886-C6

12

866852

DATE 19 AUG 81



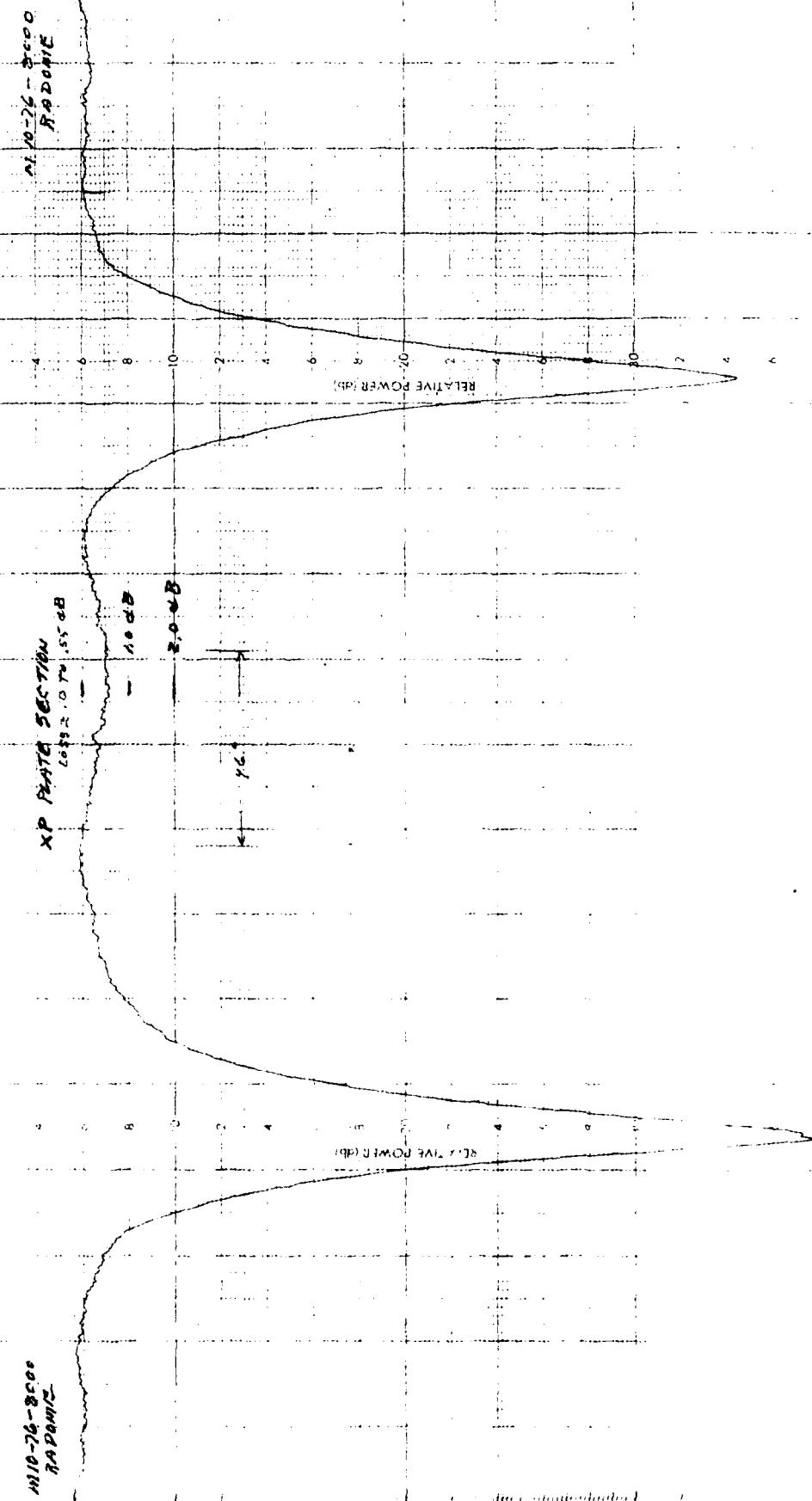


26C. HARDWARE SECTION  
74-2635 IN XP RATE SECTION

ENCR 4705 TC

DATE 15 MAR 81

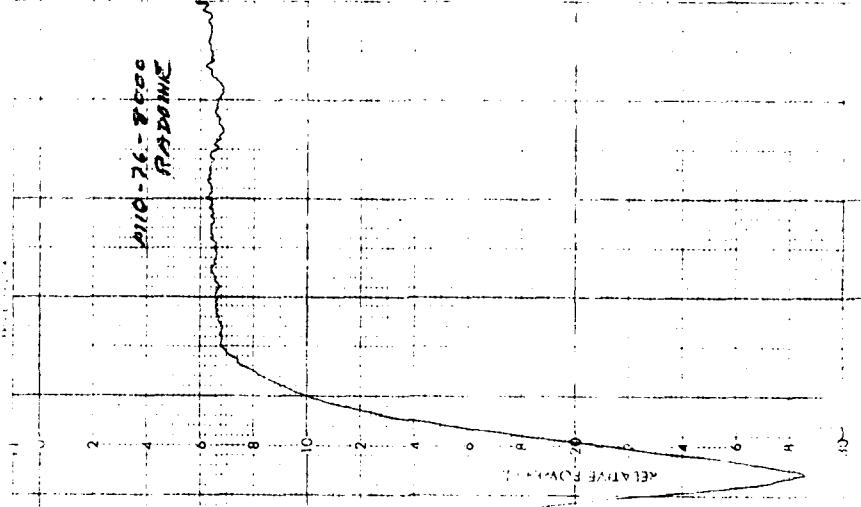
213999



-11-L READING HIGH END  
110 LOGS IN XP PLATE SECTION  
260° READINGS READING

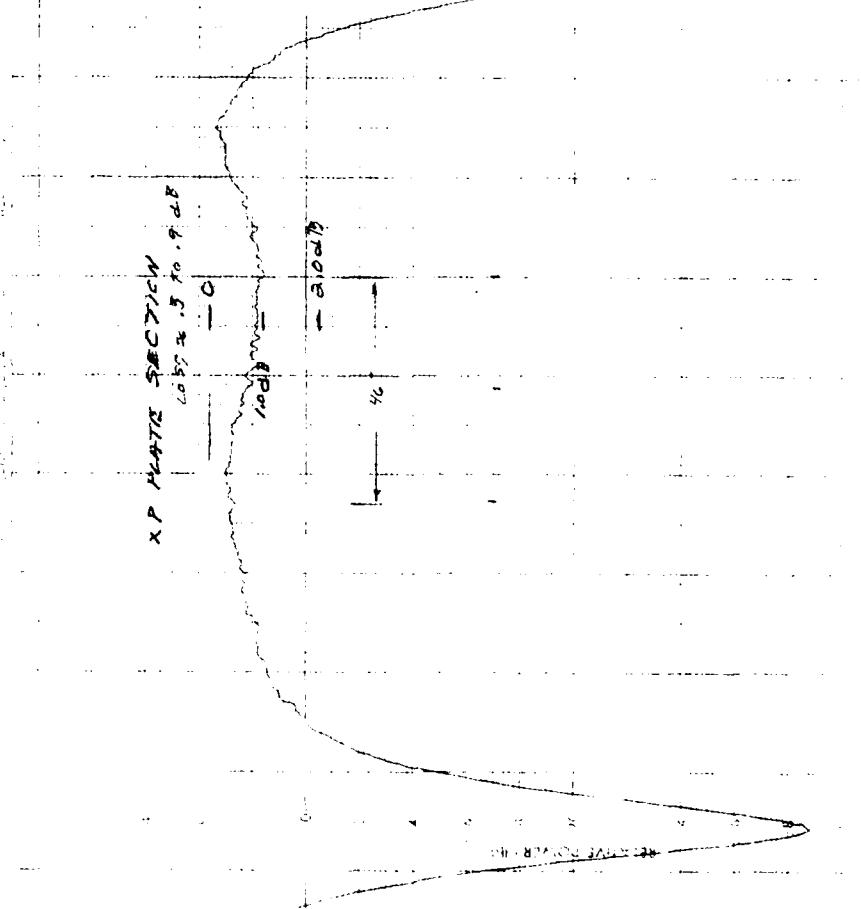
001 ENGR 8795 TC DATE 19 AUG 81

010-26-8200  
Response



X P HATTC SPEC 210  
 $1.05 \pm .5 \text{ to } .9 \text{ dB}$   
— 0

010-26-8200  
Response



010-26-8200  
Response

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